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Publications in this series have not been edited; they are released as submitted by the author.

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## Abstract

In this study we investigated coda-wave attenuation ($Q_C$) from the northern Appalachian region of eastern Canada in the two provinces of New Brunswick and Nova Scotia. We used earthquake recordings from 8 broadband and 2 short period seismograph stations of the Canadian National Seismograph Network (CNSN) across the region. Our dataset is comprised of 476 earthquakes recorded between 1983 and 2021 with magnitudes ranging from 1.5 to 4.1, depths from 0 to 20 km (with the vast majority being <10 km) and epicentral distances of 5 to 100 km. This gives a total of 261 high signal-to-noise (S/N) traces (S/N≥5.0) useful for $Q_C$ calculation (with a maximum ellipse parameter, $a_2$, of 100) across the region. Coda windows were selected to start at $t_c = 2t_S$ (two times the travel time of the direct S wave), and were filtered at center frequencies of 2, 4, 8, 12 and 16 Hz. Our study reveals a consistent pattern. We find that in the northern New Brunswick, the lowest $Q_0$ values (e.g., $Q_0$ of 61) are at station KLN which is the closest station to the epicenter of the 1982 Miramichi earthquake (M 5.8). The highest $Q_0$ values that we find (e.g., $Q_0$ of 178) are at station GGN, located in the southern New Brunswick. Smaller $Q_0$ values for stations in the north (closer to the Charlevoix-Kamouraska seismic zone or Miramichi source area) is explained by Jin and Aki's (1988) finding that $Q_0$ is lower in the vicinity of large earthquakes. An average for all the data results in a $Q$ relationship of $Q_C = 99f^{0.96}$ for the frequency band of 2 to 16 Hz for the entire region.

## Introduction

Eastern Canada is located in a stable continental region within the North American Plate and, as a consequence, has a relatively low rate of earthquake activity. Nevertheless, large and damaging earthquakes have occurred here in the past and will inevitably occur in the future. In such intraplate regions, characterizations of seismicity and attenuation relations play a crucial role in evaluation of seismic hazard.

Over the past few decades, attenuation studies that have been conducted in the east and southeastern Canada were mainly focused on Lg-wave analysis (e.g. Shin & Herrmann, 1987; Atkinson, 1989; Boatwright & Seekins, 2011; Mousavi et al., 2016; Perry et al., 2020). However, only limited studies based on S-wave coda analysis have been conducted in the southeastern Canada and northeast US (e.g., Singh & Hermann, 1983; Woodgold, 1990; Woodgold, 1994).

In this study, we examine seismic attenuation characteristics of the northern Appalachians seismic zone based upon seismic data collected by the Canadian National Seismic Network (CNSN) from 1983 to 2021. The single scattering approximation (Sato, 1977) using *S*-Wave coda is applied; the attenuation and frequency dependency for different paths and the correlation of the results with the geotectonic of the region will be presented. This article is one in a series of articles that examines coda wave attenuation across Canada in a wide range of tectonic environments (e.g. Farahbod & Cassidy, 2016; Farahbod et al., 2016; Farahbod & Cassidy, 2018 and Farahbod et al., 2019).

## Geology and tectonic setting

The Canadian Appalachian region includes the provinces of insular Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, and the southern part of Quebec along the south side of the St. Lawrence River (Figure 1). It has an area of approximately 500000 $km^2$ and it is widest (600 km) at the Canada-United States International Boundary in New Brunswick and Nova Scotia (Williams, 1995). A larger unexposed area of Appalachian rocks and structures extends across the Gulf of St. Lawrence and seaward to the Atlantic continental edge. Because of its coastal setting and insular makeup, the region offers tremendous shoreline exposures along marine passages (Williams, 1995).

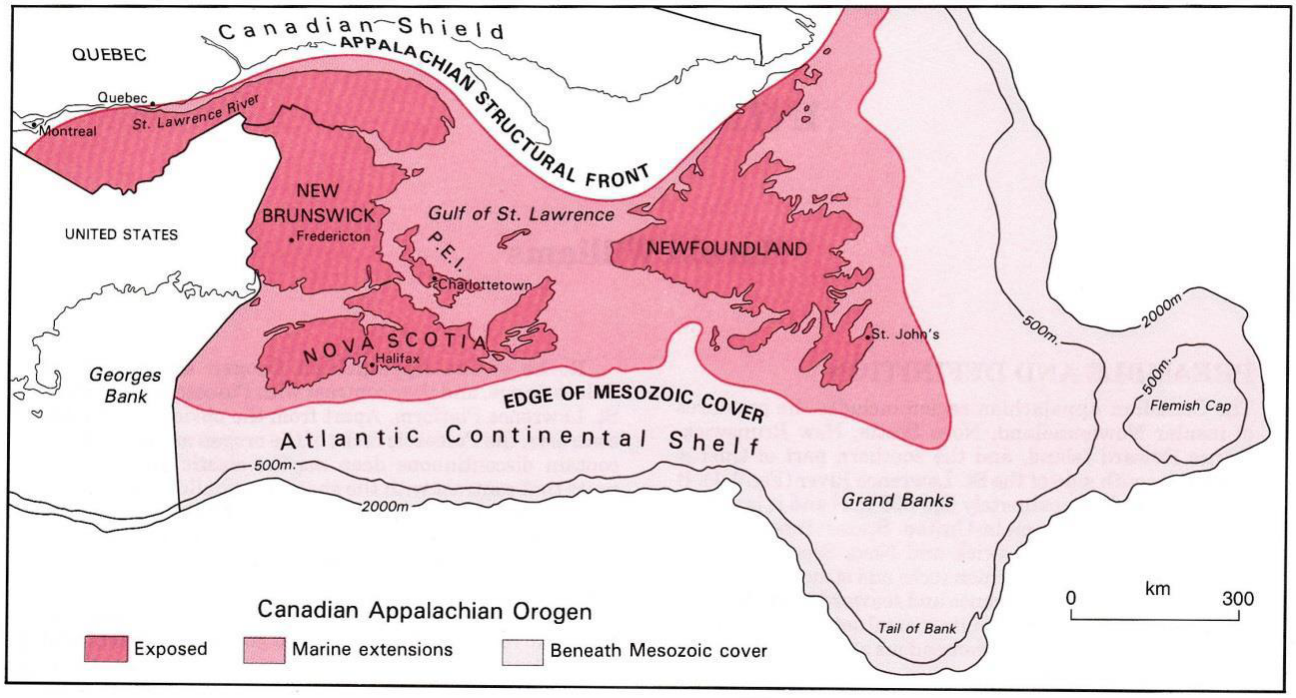


**Figure 1**: Canadian Appalachian region, from Williams (1995).

The Appalachian region is a Paleozoic geological mountain belt or orogen. This means that its rocks have been affected by orogeny, the combined effects of folding, faulting, metamorphism, and plutonism (Williams, 1995). The Canadian Appalachian region is bordered to the west by that part of the Canadian Shield known as the Grenville Structural Province, and also by that part of the Interior Platform known as the St. Lawrence Lowlands Platform (Figure 2).

The Canadian Shield is a large thin-soiled area over a part of the stable North American craton, composed of base rock dating to the Precambrian era (between 4.5 billion and 540 million years ago). The St. Lawrence Platform (570 to 430 Ma) developed at the end of the Proterozoic and during the Paleozoic, with the formation of the Saint Lawrence rift. It covers an area of more than 30,000 km$^2$ and overlies rocks of the Grenville Province. It is divided into two distinct platforms: the St. Lawrence Lowlands Platform and the Anticosti Platform.

The Appalachian Province (600 to 300 Ma) developed along the edge of the Canadian Shield during the Paleozoic. It is divided into five broad zones based on stratigraphic and structural contrasts between Cambrian–Ordovician and older rocks. From west to east, these are the Humber, Dunnage, Gander, Avalon, and Meguma Zones (Williams, 1979) (Figure 3).

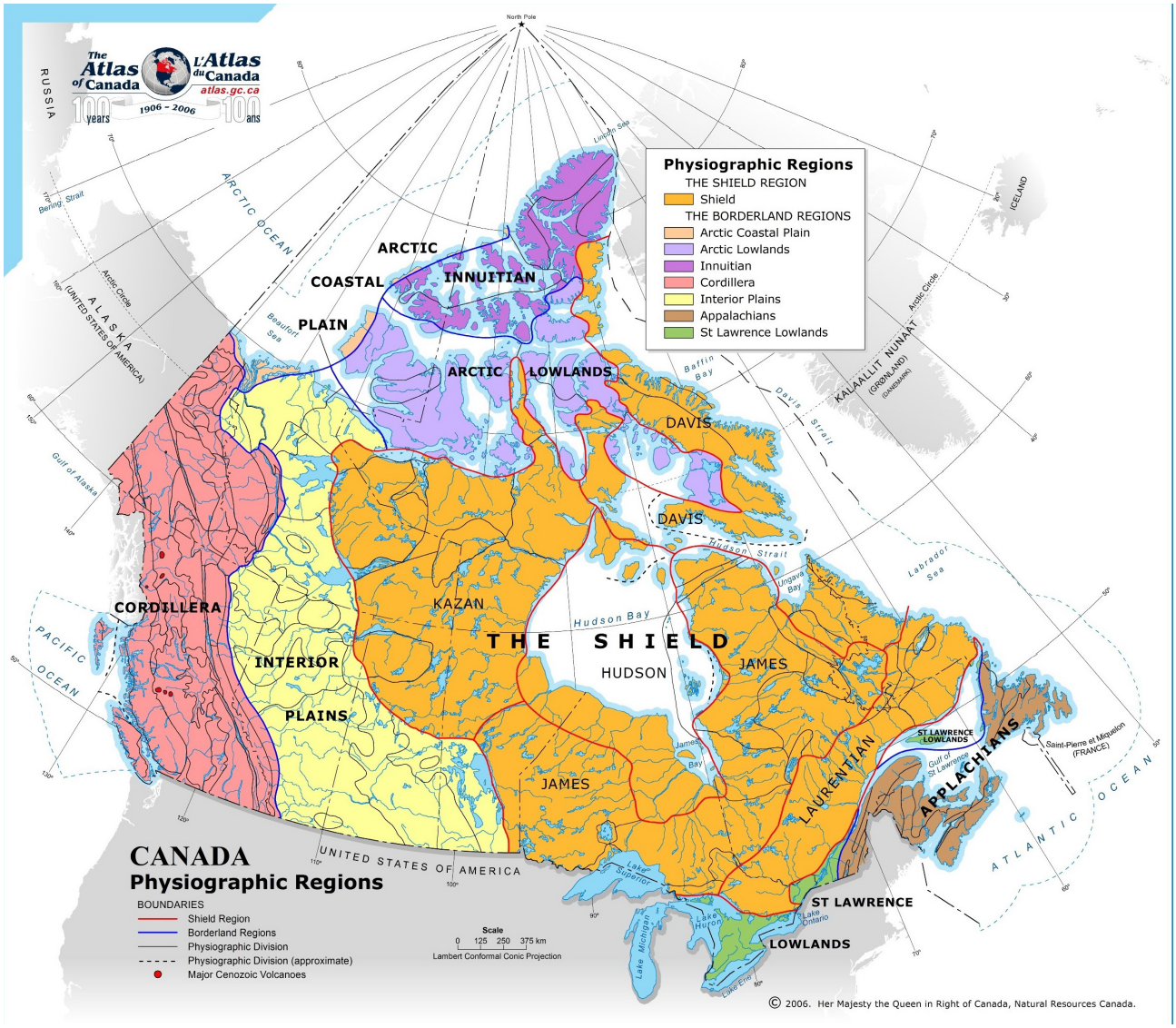


**Figure 2**: Physiographic regions of Canada (from altas.gc.ca).

The tectonostratigraphic domains of the evolving orogenic belt are used to divide the Appalachians into workable packages for geological consideration. The Lower Paleozoic tectonostratigraphic zones (Williams, 1979) include the Humber (Laurentia's continental domain), Dunnage (peri-Laurentia and peri-Gondwana oceanic domains), the Gander and Avalon zones (peri-Gondwana oceanic and continental domains, respectively), and the Meguma Zone (a late-accreted peri-Gondwana continental terrane) (Figure 3). These belts record the complex evolution of the Cambrian and Ordovician orogenies and were affected by post-Taconian events that shaped up the Appalachians. The post-Taconian to syn-Acadian basins are developed over the Taconian zones (Figure 3); the best known of these basins is the Gaspé Belt that is preserved in various tectonostratigraphic assemblages: the Connecticut Valley–Gaspé

synclinorium, the Aroostook–Percé anticlinorium and the Chaleurs Bay synclinorium (Malo et al., 2008).

In summary, the Humber Zone records the development and destruction on an Atlantic-type continental margin, i.e., the ancient continental margin of Eastern North America that lay to the west of Iapetus; the Dunnage Zone represents vestiges of Iapetus with island arc sequences and mélanges built upon oceanic crust; and the Gander Zone records the development and destruction of a continental margin, at least in places of Andean type, that lay to the east of Iapetus. The Precambrian development of the Avalon Zone relates either to rifting and the initiation of Iapetus or to subduction and a cycle that preceded the opening of Iapetus. During the Cambrian Period, the Avalon Zone was a stable platform or marine shelf. Cambrian–Ordovician rocks of the Meguma Zone represent either a remnant of the continental embankment of ancient Northwest Africa or the marine fill of a graben developed within the Avalon Zone (Williams, 1979).

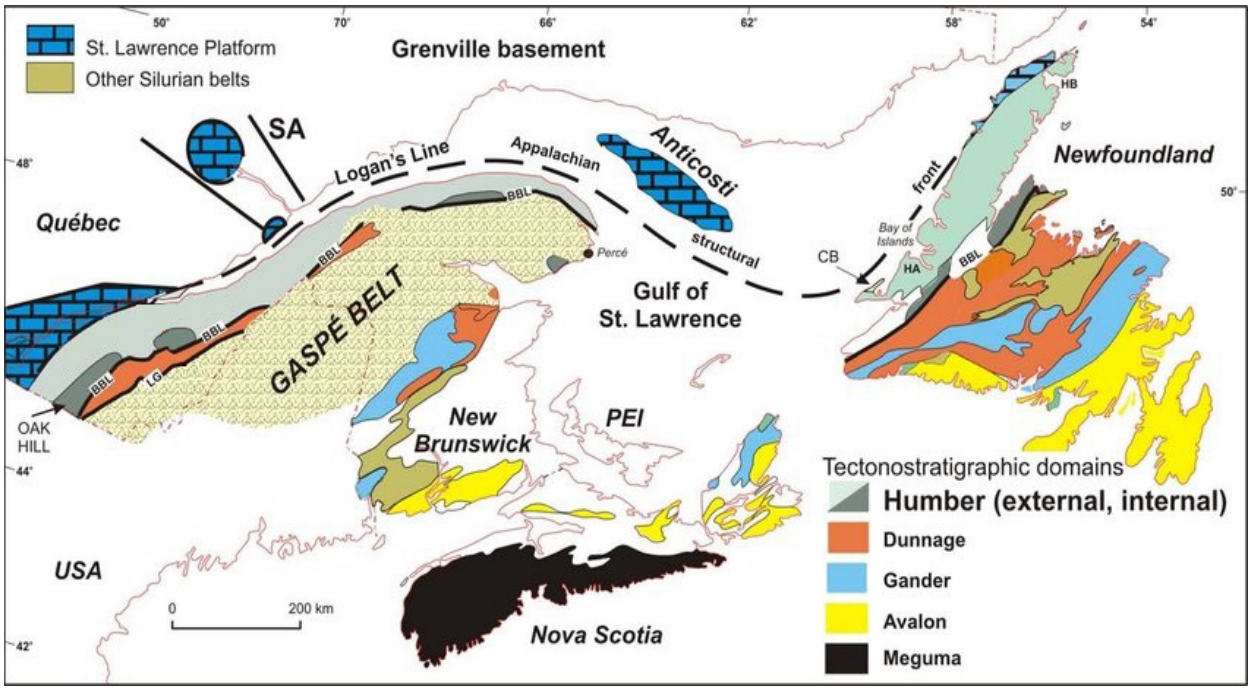


**Figure 3**: Taconian tectonostratigraphic domains and the Silurian-Devonian basin (Gaspé Belt) of the Canadian Appalachians (Courtesy: Malo et al., 2008).

In Nova Scotia, the Meguma terrane is separated from the Avalon terrane by the Cobequid - Chedabucto Fault system, which runs east–west from Chedabucto Bay to Cobequid Bay and the Minas Basin (Figure 4).

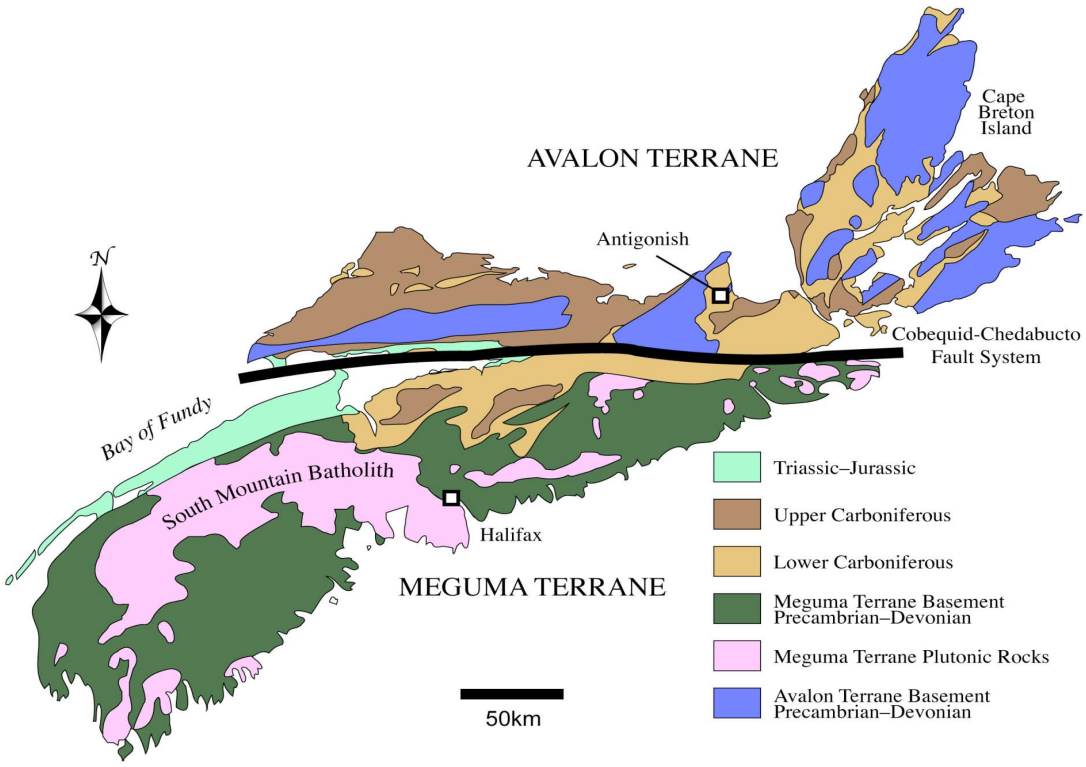


**Figure 4**: Simplified geological map of Nova Scotia. The Cobequid - Chedabucto Fault system (zone) marks the terrane boundary between the Avalon and the Meguma zones (Courtesy: Tweedale, 2012).

## Regional Seismicity

Eastern Canada is part of the stable interior of the North American Plate. Therefore, seismic activity is related to the regional stress fields, with the earthquakes concentrated in regions of crustal weakness. In southeastern Canada years of recordings have identified five zones with greater earthquake activity (Figure 5): 1) West Quebec, 2) Charlevoix-Kamouraska, 3) Lower St. Lawrence, 4) Northern Appalachians, and 5) Laurentian Slope (Grand Banks).

The Western Quebec Seismic Zone constitutes a vast territory that encloses the Ottawa Valley from Montreal to Temiscaming, as well as the Laurentians and the Eastern Ontario. The urban areas of Montreal, Ottawa-Hull and Cornwall are located in this zone. The Western Quebec Zone was the site of at least three significant earthquakes in the past: in 1732 (M 5.8); 1935 (M 6.1); and 1944 (M 5.6) where M is either moment magnitude or the best magnitude estimate from the available information (Lamontagne et al., 2008).

Located some 100 km downstream from Quebec City, the Charlevoix Seismic Zone is the most seismically active region of eastern Canada. As most earthquakes occur under the St. Lawrence River, between Charlevoix County on the north shore and Kamouraska County on the south shore, this region is also often referred to as the Charlevoix-Kamouraska Seismic Zone. Historically, the zone has been subject to five earthquakes of magnitude 6 or larger: in 1663 (M 7); 1791 (M 6); 1860 (M 6); 1870 (M 6.5); and 1925 (M 6.2).

Located some 400 km downstream from Quebec City in the estuary of the St. Lawrence River, the Lower St. Lawrence Seismic Zone is a seismically active region of eastern Canada. As most earthquakes occur under the St. Lawrence River, between the regions of the Quebec North Shore and the Lower St. Lawrence, this zone is sometimes referred to as the "Lower-St. Lawrence-Quebec North Shore" Seismic Zone. Unlike the Charlevoix Seismic Zone, no large ($M > 6$) earthquake has ever been reported or recorded in the Lower St. Lawrence zone and only two (M 5.1) events in 1944 and 1999 are known to have exceeded magnitude 5.0.

The Northern Appalachians Seismic Zone includes most of New Brunswick and extends into New England as far south as Boston. In the Miramichi area of central New Brunswick, a series of significant earthquakes occurred in 1982 (the largest M 5.8) and was followed by numerous aftershocks (Lamontagne et al., 2008; Ma & Motazedian, 2017). The zone witnesses a continuing low level of seismic activity including many larger historic earthquakes in New Brunswick.

The largest recorded earthquake in southeastern Canada occurred in 1929 (M 7.2) in the Laurentian slope seismic zone that comprises an area off Canada's southeast coast, which includes the Grand Banks of Newfoundland. The earthquake was responsible for a large tsunami which tragically drowned 27 people when it came ashore on the Burin Peninsula in southern Newfoundland. This was one of the few incidents involving loss of life in any recorded Canadian earthquake (Cassidy et al., 2010).

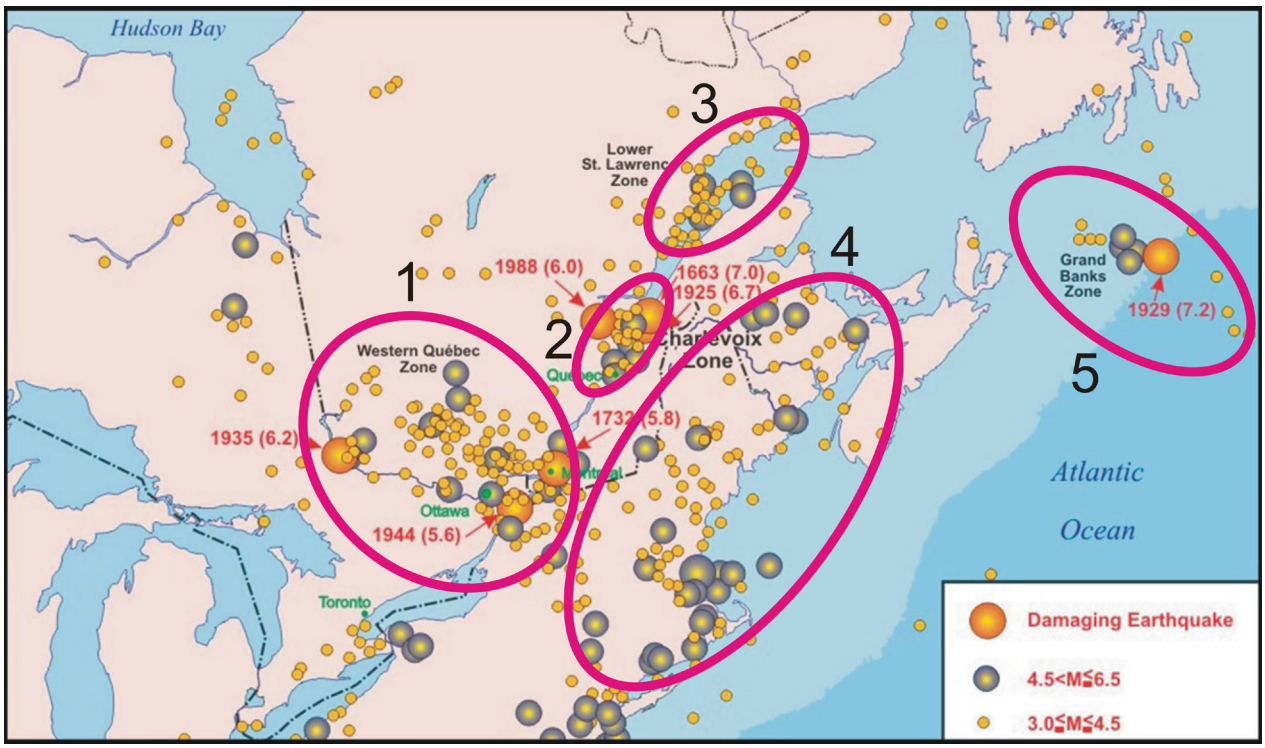


**Figure 5**: Seismicity of southeastern Canada (historical and instrumentally-recorded earthquakes) modified from Lamontagne, 2004. Damaging earthquakes, with magnitudes in brackets, include: 1663 and 1925 in Charlevoix; 1732 near Montréal; 1929 Grand Banks; 1935 Timiskaming; 1944 Cornwall-Massena; and 1988 Saguenay.

## The coda *Q* method

In this study and in all of our studies across Canada, we determine the coda $Q$ factor using the single backscattering approximation, which explains the decay of earthquake coda under the assumption of weak isotropic scattering from homogeneously distributed heterogeneities [Aki, 1969; Aki & Chouet, 1975; Sato 1977]. The coda waves are assumed to comprise S-to-S backscattered waves, which do not produce secondary scattering when encountering another scatterer and the measured coda $Q$, ($Q_C$) depends on both intrinsic and scattering attenuation [Aki & Chouet, 1975; Wu & Aki, 1988]. The coda wave amplitude at frequency f, and lapse time t (time from the event origin) is described by

$$A(f, t) = S(f)t^{-\nu}e^{-\pi ft/Qc} \qquad (1)$$

where S(f) is the source factor which is related to the earthquake's source spectrum and includes station site, backscattering, and source effects [Wu & Aki, 1988]. The geometrical spreading parameter ν is 1,

0.5 and 0.75 for body-wave scattering (this study), surface wave scattering, and diffusion, respectively [Aki & Chouet, 1975]. Equation (1) assumes that the source and receiver are at the same point, a good approximation only for signals at a lapse time, t, greater than 2 times the travel time of the direct S wave, $t_S$ [Rautian & Khalturin, 1978; Sato, 1977]. Equation (1) for body-waves can be written as

$$ln(A(f, t)) + ln(t) = ln(S(f)) - \pi ft/Q_C \qquad (2)$$

so that, $Q_C$ can be obtained by linear regression of ln(A(f, t)) on t over a coda time window at a constant frequency f. In practice, A(f, t) is obtained by bandpass-filtering the coda signal over a narrow passband centered on frequency f and fitting a time decay envelope to the filtered signal [Rautian & Khalturin, 1978]. When many decay curves are available for the same region, all data can be inverted simultaneously to obtain one $Q_C$ value [Aki & Chouet, 1975; Havskov et al., 1989]. Obtaining one $Q$ value for each decay curve and averaging $Q^{-1}$ values gives the same result [Kvamme, 1985]. This latter method has the additional advantages of faster computation and the ability to check the fit to equation (2) to eliminate bad results [Havskov et al., 1989].

Assuming that the coda window starts at $t_1=2t_S$, the end time $t_2$ controls the maximum size of the volume sampled by the backscattered waves [Zelt et al., 1999]. The sampling volume is one-half of a three-dimensional ellipsoid, with the source and receiver as focal points, semi-major axis $a_1 = V_S t/2$ and semi-minor axis $a_2 = (a_1^2 - R^2/4)^{1/2}$, where $V_S$ is the average S-wave velocity (3.5 km/sec) and R is the station-event separation [Pauli, 1984]. For similar $a_1$ and $a_2$, the sampled volume is nearly a sphere and the maximum depth sampled is approximately given by $Z_{max} = a_2 + d/2$, where d is the event depth [Havskov et al., 1989; Zelt et al., 1999].

Practically, to make meaningful comparisons of $Q_C$ from different regions, it is important to make estimates of the volumes sampled by different stations. The average sampling volume can be determined by setting $t = (t_1 + t_2)/2$ in the equation for $a_1$ [Havskov et al., 1989]. Therefore, by varying $t_2$, it is possible to ensure that the volumes being sampled by each event-station combination are approximately the same [Zelt et al., 1999].

## Data and Analysis

For calculating $Q_C$, we used seismic waveform data from 2 short period (EBN, KLN) and 8 broadband CNSN sites (BOIN, CHEG, GBN, GGN, HAL, HSNB, LMN and MCNB) in New Brunswick

and Nova Scotia (Figure 6). These data have sampling rates of either 100 Hz or 40 Hz (broadband station) and 60 HZ (short period station) with a flat frequency response from 1 to 16 Hz. Maps of the event-station configurations for the stations are provided (in Appendix 1) for selected earthquakes in a radius of 100 km around each seismic station.

Our dataset is comprised of 476 earthquakes recorded between 1983 and 2021 with magnitudes ranging from 1.5 to 4.1 (Figure 7), depths from 0 to 20 km (with the vast majority being <10 km) and epicentral distances of 5 to 100 km. This gives a total of 261 high signal-to-noise (S/N) traces (S/N≥5.0) useful for $Q_C$ calculation; however, the number of traces actually used for analysis depends on sampling size. The coda window length used in this study is 20 seconds except for epicentral distances less than 30 km for which it is 10 sec.

For each event-station combination, we picked P-wave and S-wave arrivals and relocated earthquakes considering a velocity model used for standard earthquake locations in this region. Then we calculated $Q_C$ at five frequencies between 2 and 16 Hz (Figure 8) using equation (2). The frequency dependence of $Q_C$ can be expressed as $Q_C = Q_0 f^{\alpha}$ [Rautian & Khalturin, 1978]; $Q_0$ ($Q_C$ at 1 Hz) and α, are obtained by linear regression of log ($Q_C$) on log (f). For each station, $Q_C$ is determined by averaging the calculated values from all events.

In general, $Q_C$ increases with lapse time which likely is a result of including a greater volume of less complex upper mantle material in the sampling volume [Pauli, 1984 & Zelt et al., 1999]. Therefore, in order to reduce sampling size and to ensure that approximately equivalent volumes are sampled at each station used to calculate $Q_C$, we fixed $a_2$ and average of maximum lapse time to specific values. These values are selected based on the location distribution of earthquakes around the stations.

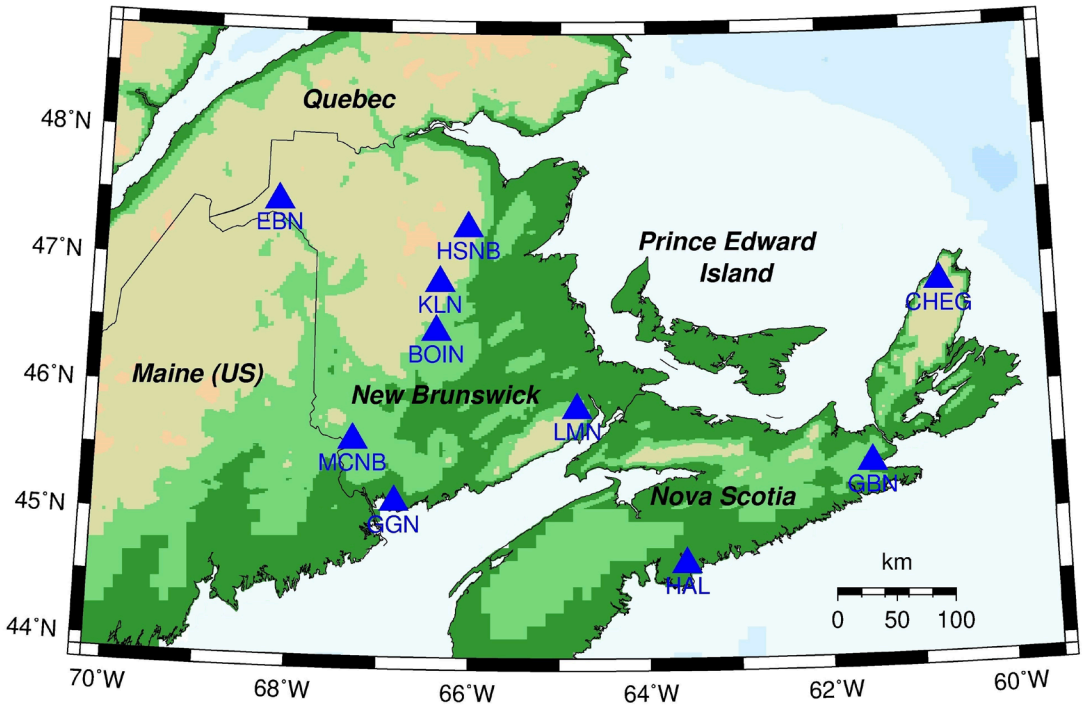


**Figure 6:** Seismograph stations in the study area. Data for this study were acquired from the CNSN stations (blue triangles) in New Brunswick and Nova Scotia.

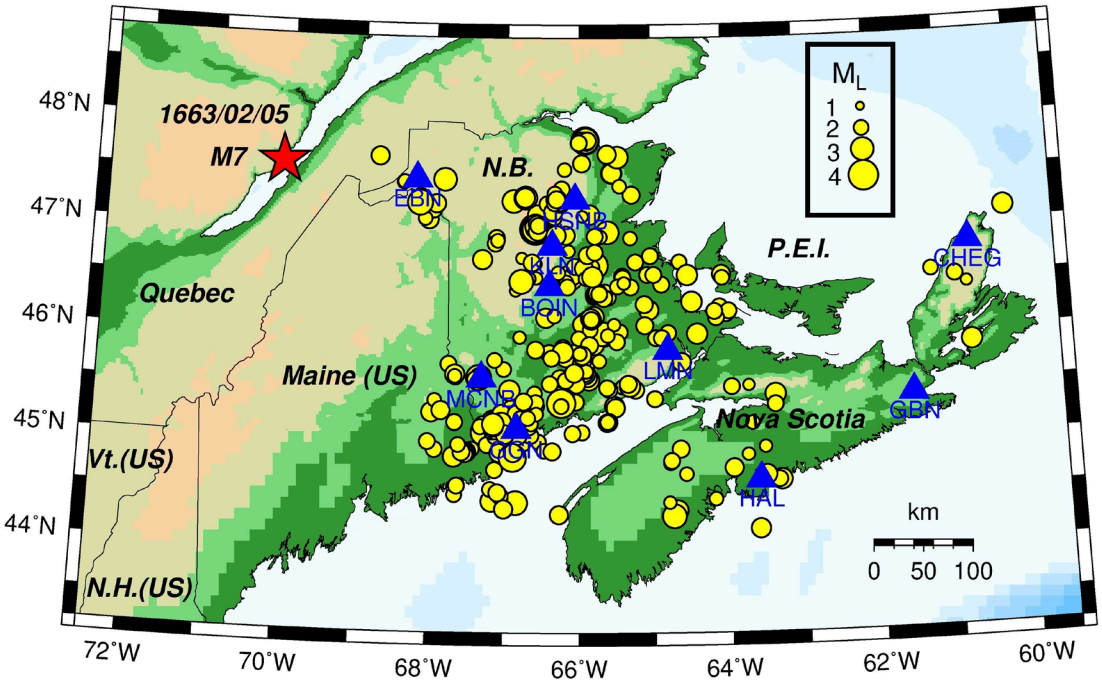


**Figure 7:** Recorded earthquakes by the CNSN stations (blue triangles) in New Brunswick and Nova Scotia that were used for this study. Red star represents the possible location of the 1663 (M 7) earthquake in the Charlevoix-Kamouraska seismic zone.

We used the computer program SEISAN [Havskov and Ottemöller, 2012] to calculate coda Q. The program calculates $Q_C$ for a series of events and stations at five frequencies (2, 4, 8, 12 and 16 Hz). On completion, the average values are calculated and a $Q_C$ versus f curve is fit to the calculated values [Havskov and Ottemöller, 2010]. The program also plots the individual events and filtered coda windows (Figure 8).

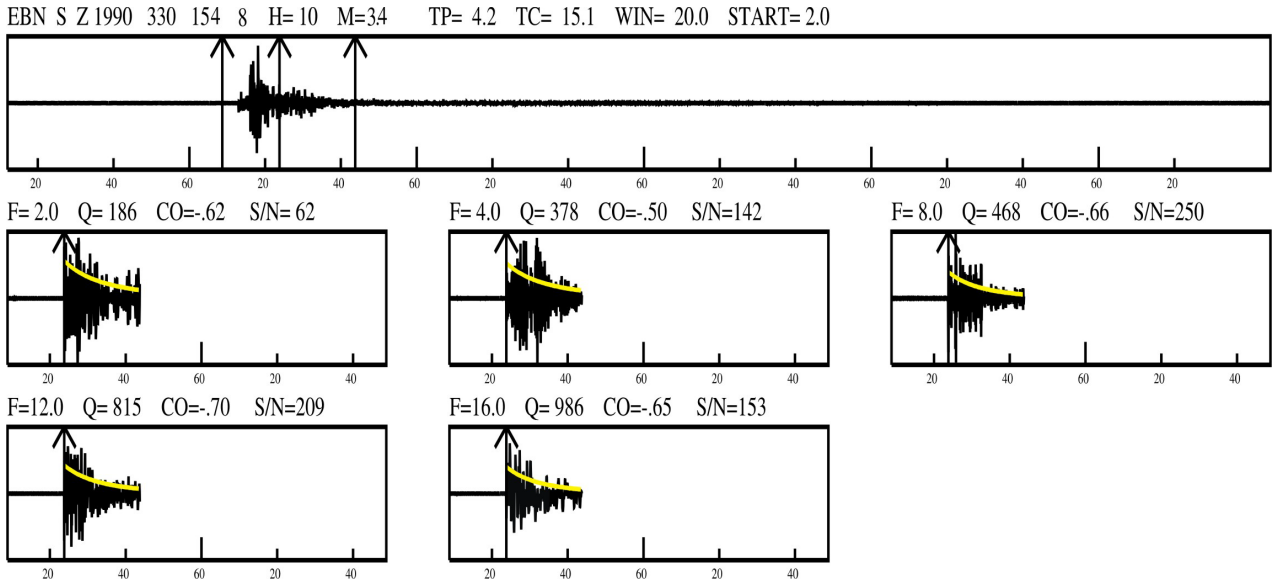


**Figure 8**: Data processing example for an earthquake on March 30, 1990 (station EBN). The first step is a visual inspection of available waveforms and the selection of the closest stations to the event with the highest SN ratio (top). For each station (if SN**≥5.0)**, the top trace is the original unfiltered waveform where the 3 vertical lines indicate (from left) origin time, start and end of coda window. Above the seismogram is first the station code, origin time, depth (h), magnitude (ML), P-wave travel time (TP, s), start of coda window from the origin (TC, s), window length (WIN, s) and start of coda window in terms of S-wave travel time (t coda > ST*S-travel time). The amplitude decay corresponding to estimation parameters (f: frequency, C: correlation coefficient and SN: signal-to-noise ratio) are shown by the yellow curve in the five filtered segment.

## Coda Q Results

In order to make a regional comparison of $Q_C$ over the study area, it is necessary to use the shortest possible event-station paths. This, rules out simply selecting all the data with high signal-to-noise ratio. Therefore, we calculated $Q_C$ at different stations by using different sets of ellipse parameter $a_2$ (20-100 km) and lapse time (12-60 sec) with maximum sampling depth (on average) between 23 km and 105 km (Tables 1 and 2). For one station (BOIN) due to the quality of waveforms no $Q$ estimate is available.

The corresponding estimated $Q_0$ error for each station with five or more events ranges from 2 to 18 (bold values in Table 1). Error in frequency dependency factor (α) varies between 0.01 and 0.22 (Table 2).

Overall, there is an increase in $Q_0$ values with increasing sampling volume. Our estimated $Q_0$ values (with five or more events used for each estimate) are the lowest at station KLN ($Q_0$ = 61, $a_2$=30 km) in central New Brunswick. The highest $Q_0$ value is observed at station GGN in southwest New Brunswick ($Q_0$ = 178, $a_2$=80 km). An average for all the data results in a $Q$ relationship of $Q_C = 99f^{0.96}$ for the frequency band of 2 to 16 Hz for the entire region. Average $Q$ relationship for each station is given in Table 3.

## Summary and conclusions

We investigated coda-wave attenuation in the Northern Appalachians Seismic Zone in the provinces of New Brunswick and Nova Scotia using the single scattering approximation on records from short period and broadband stations of the Canadian National Seismic Network. Coda windows were selected to start at $t_C = 2t_S$ and were filtered at center frequencies of 2, 4, 8, 12 and 16 Hz. We estimated coda Q for stations in a vast area covering a wide range of tectonic settings (Figures 9 & 10). The highest $Q_0$ of 178 ($t_{lapse}$=80 sec, station GGN) is on southern part of New Brunswick where Siluro-Devonian rocks are identified as successor basins. The lowest $Q_0$ of 61 ($t_{lapse}$=30 sec, station KLN) was observed in the central New Brunswick in an area mainly covered with younger rocks. This region is very close to the epicenter of the 1982 Miramichi earthquake and in minimum distance to KLN among the neighboring seismic stations (KLN: 25 km, HSNB: 51 km and BOIN: 62 km). In general, lower calculated $Q_0$ values for stations in the north, either closer to the epicentral area of the Miramichi earthquake (i.e. KLN versus LMN, Figure 9) or closer to the Charlevoix-Kamouraska seismic zone (i.e. EBN versus GGN and LMN, Figure 10) are explained by Jin and Aki's (1988) finding that $Q_0$ is lower in the vicinity of large earthquakes (Farahbod & Cassidy, 2021).

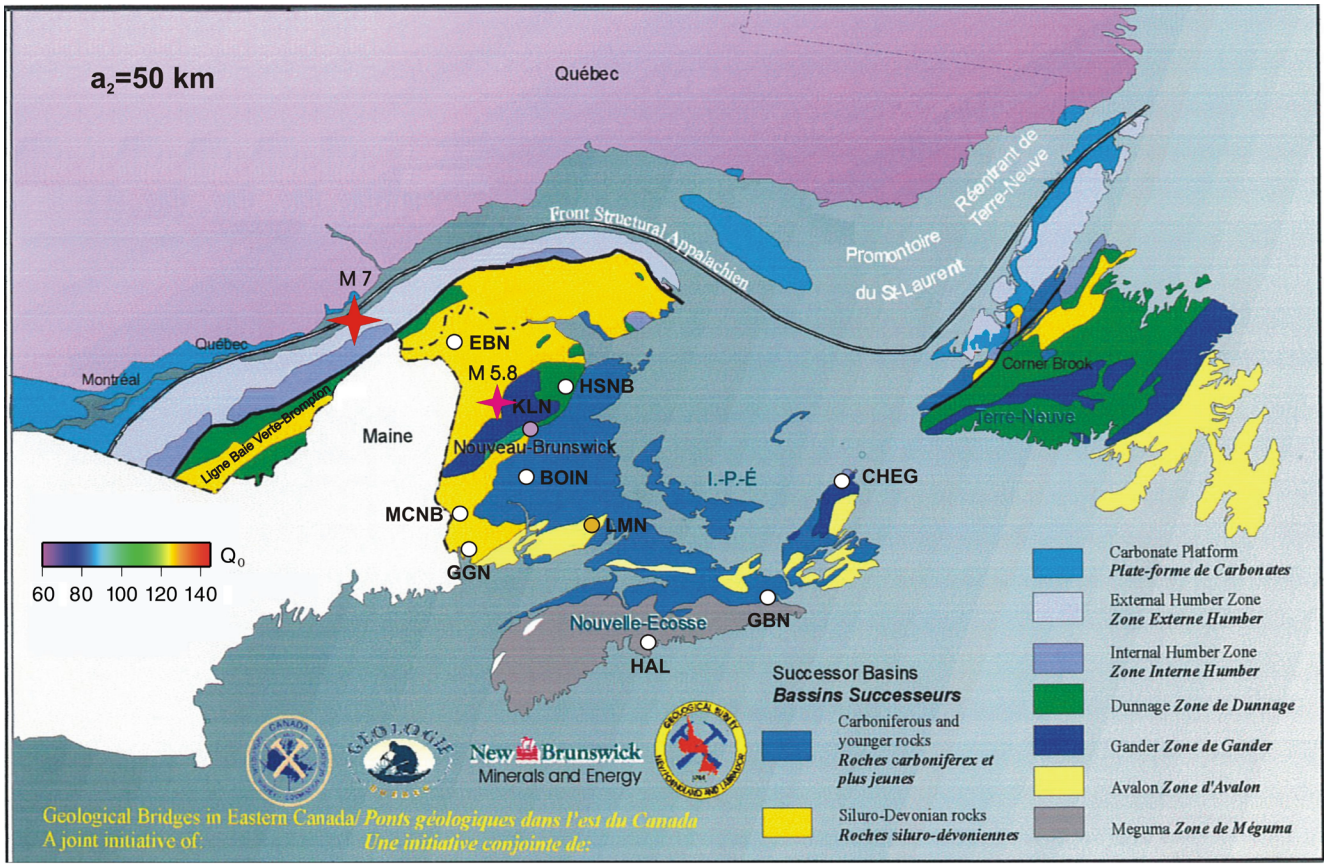


**Figure 9:** Map of $Q_0$ variations (shaded circles) with five or more events used for each estimate and ellipse parameter $a_2$=50 km (KLN and LMN), superimposed on the geological map of the region (original map: courtesy of Lavoie et al., 2001). Stars represent 1982/01/09 Miramichi earthquake (M 5.8) and 1663/02/05 (M 7) earthquake in Charlevoix-Kamouraska seismic zone.

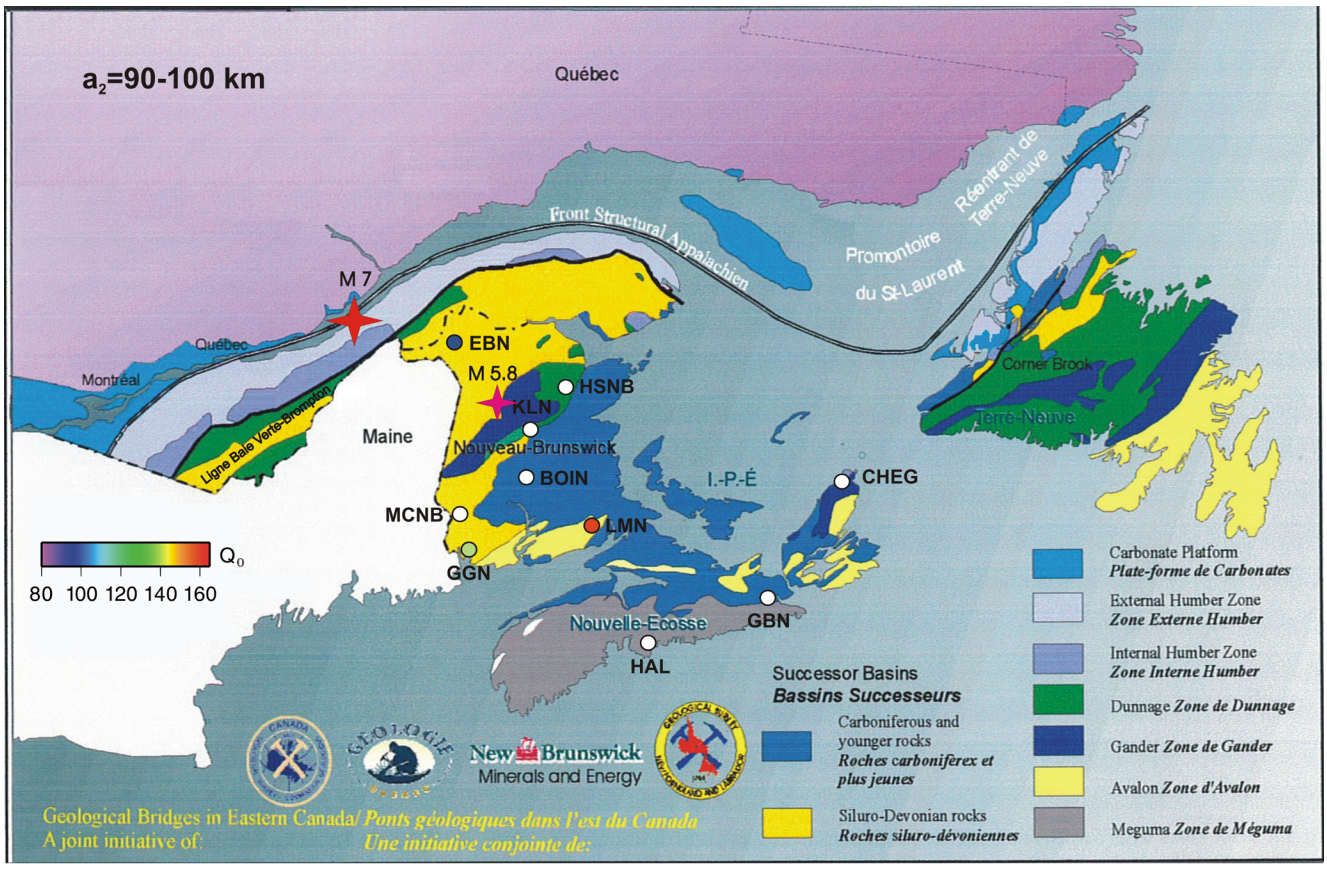


**Figure 10:** Map of $Q_0$ variations with five or more events used for each estimate and ellipse parameter $a_2$=90-100 km (EBN, GGN and LMN), superimposed on the geological map of the region (original map: courtesy of Lavoie et al., 2001). Stars represent 1982/01/09 Miramichi earthquake (M 5.8) and 1663/02/05 (M 7) earthquake in Charlevoix-Kamouraska seismic zone.

**Table 1:** Average $Q_0$ and estimated uncertainties for different sampling volumes. Number of events is given in parentheses after each estimated value. Values based on more than 4 data points are highlighted in bold.

| Station | $Q_0$ ± error ($a_2$=20 km, $t_{lapse}$=12s) | $Q_0$ ± error ($a_2$=30 km, $t_{lapse}$=18 s) | $Q_0$ ± error ($a_2$=40 km, $t_{lapse}$=24 s) | $Q_0$ ± error ($a_2$=50 km, $t_{lapse}$=30 s) | $Q_0$ ± error ($a_2$=60 km, $t_{lapse}$=36 s) | $Q_0$ ± error ($a_2$=70 km, $t_{lapse}$=42 s) | $Q_0$ ± error ($a_2$=80 km, $t_{lapse}$=48 s) | $Q_0$ ± error ($a_2$=90 km, $t_{lapse}$=54 s) | $Q_0$ ± error ($a_2$=100 km, $t_{lapse}$=60s) |
|---|---|---|---|---|---|---|---|---|---|
| BOIN | - | - | - | - | - | - | - | - | - |
| CHEG | - | - | - | - | - | - | - | - | - |
| EBN | - | 98 ± 5(2) | - | 72 ± 6(1) | - | - | - | **101 ± 3(5)** | - |
| GBN | 165 ± 4(1) | - | - | - | - | - | - | - | - |
| GGN | **70 ± 8(14)** | 78 ± 7(4) | - | 133 ± 8(4) | 100 ± 3(4) | - | **178 ± 5(9)** | **130 ± 2(6)** | - |
| HAL | 45 ± 14(2) | - | - | - | - | - | - | - | - |
| HSNB | **65 ± 10(5)** | - | 82 ± 8(3) | 152± 18(3) | - | - | - | - | - |
| KLN | **71 ± 5(76)** | **61 ± 8(11)** | **72 ± 4(6)** | **63 ± 5(8)** | - | 90 ± 4(4) | - | - | - |
| LMN | 96 ± 10(2) | - | - | **128 ± 4(5)** | - | 129 ± 15(3) | 120 ± 17(3) | - | **158 ± 7(5)** |
| MCNB | - | - | - | - | - | - | - | - | - |

**Table 2:** Average α values and estimated uncertainties and average $Z_{max}$ for different sampling volumes.

| Station | α ± error ($a_2$=20 km, $t_{lapse}$=12 s) | α ± error ($a_2$=30 km, $t_{lapse}$=18 s) | α ± error ($a_2$=40 km, $t_{lapse}$=24 s) | α ± error ($a_2$=50 km, $t_{lapse}$=30 s) | α ± error ($a_2$=60 km, $t_{lapse}$=36 s) | α ± error ($a_2$=70 km, $t_{lapse}$=40 s) | α ± error ($a_2$=80 km, $t_{lapse}$=48 s) | α ± error ($a_2$=90 km, $t_{lapse}$=54 s) | α ± error ($a_2$=100 km, $t_{lapse}$=60 s) |
|---|---|---|---|---|---|---|---|---|---|
| BOIN | - | - | - | - | - | - | - | - | - |
| CHEG | - | - | - | - | - | - | - | - | - |
| EBN | - | 0.83 ± 0.03 | - | 1.08 ± 0.05 | - | - | - | 0.95 ± 0.01 | - |
| GBN | 0.80 ±.0.04 | - | - | - | - | - | - | - | - |
| GGN | 1.07 ±.0.10 | 1.11 ±.0.08 | - | 0.83 ± 0.09 | 0.97 ± 0.03 | - | 0.75 ± 0.06 | 0.82 ± 0.01 | - |
| HAL | 1.31 ± 0.22 | - | - | - | - | - | - | - | - |
| HSNB | 1.17 ±.0.11 | - | 1.05 ±.0.10 | 0.86 ± 0.20 | - | - | - | - | - |
| KLN | 1.07 ±.0.05 | 1.22 ±.0.08 | 1.17 ±.0.04 | - | 1.05 ±.0.04 | - | - | - | - |
| LMN | 0.84 ± 0.03 | - | - | 0.95 ± 0.02 | - | 0.85 ± 0.18 | 0.93 ± 0.15 | - | 0.80 ± 0.05 |
| MCNB | - | - | - | - | - | - | - | - | - |
| Ave. $Z_{max}$ | 23 ± 8 km | 30 ± 8 km | 41 ± 6 km | 54 ± 9 km | 60 ± 6 km | 73 ± 5 km | 83 ± 7 km | 94 ± 9 km | 105 ± 3 km |

**Table 3:** Overall average value of $Q_0$ and $\alpha$ for each station (frequency band of 2 to 16 Hz). Number of events is given in parentheses after each estimated value.

| Station | $Q_0 \pm$ error | $\alpha \pm$ error |
|---|---|---|
| BOIN | - | - |
| CHEG | 70 ± 10(3) | 1.07 ±.0.11 |
| EBN | 99 ± 5(9) | 0.91 ±.0.05 |
| GBN | 165 ± 4(1) | 0.80 ±.0.04 |
| GGN | 101 ± 3(42) | 0.95 ±.0.03 |
| HAL | 77 ± 3(6) | 1.08 ±.0.02 |
| HSNB | 137 ± 4(12) | 0.79 ±.0.04 |
| KLN | 73 ± 4(99) | 1.08 ±.0.05 |
| LMN | 118 ± 2(26) | 0.94 ±.0.01 |
| MCNB | 94 ± 5(8) | 1.04 ±.0.07 |

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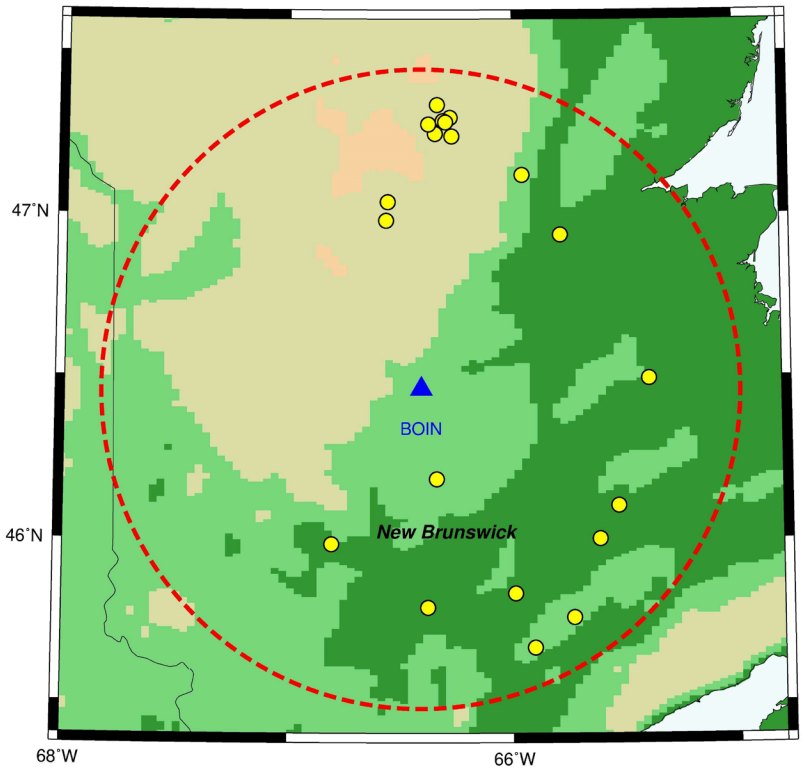
# Appendix 1

Selected earthquakes for this study within 100 km of seismic stations (alphabetically sorted)
(Source: http://www.earthquakescanada.nrcan.gc.ca)

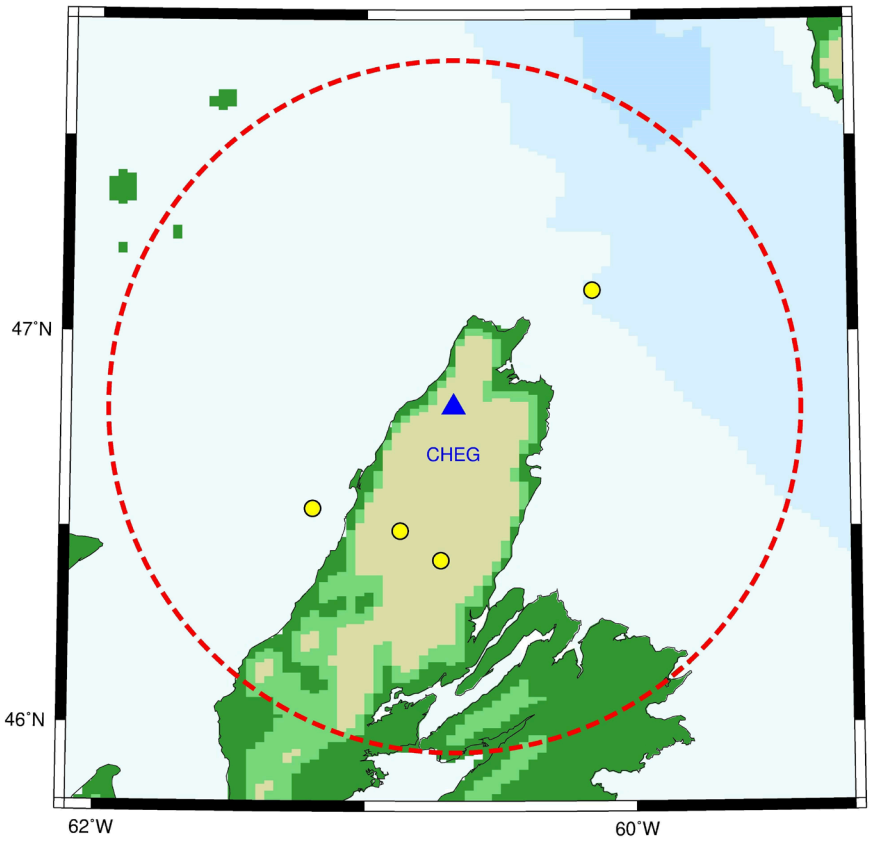
**Station BOIN**




| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 2020-04-21 04:33:29 | 47.296 | -66.280 | 2.0 | 1.9 | 61 km SW from Bathurst, NB |
| 2020-05-13 15:10:54 | 47.238 | -66.272 | 5.0 | 1.6 | 65 km SW from Bathurst, NB |
| 2020-05-20 11:01:20 | 46.182 | -66.339 | 5.0 | 1.9 | 37 km NE from Fredericton, NB |
| 2020-06-16 08:15:35 | 46.101 | -65.531 | 2.0 | 1.7 | 38 km W from Salisbury, NB |
| 2020-06-18 15:46:10 | 46.979 | -66.567 | 5.0 | 2.4 | 63 km E from Plaster Rock, NB |
| 2020-06-26 23:26:56 | 45.663 | -65.905 | 5.0 | 1.9 | 15 km N from Hampton, NB |
| 2020-07-01 15:54:48 | 47.120 | -65.957 | 2.0 | 1.5 | 39 km W from Miramichi, NB |
| 2020-07-04 00:07:50 | 47.335 | -66.337 | 2.0 | 2.0 | 63 km SW from Bathurst, NB |
| 2020-07-21 15:33:16 | 46.936 | -65.784 | 5.0 | 2.2 | 25 km W from Miramichi, NB |
| 2020-07-23 17:59:07 | 45.982 | -66.807 | 0.0 | 1.7 | Blast, W of Fredericton, NB |
| 2020-07-26 01:58:33 | 45.757 | -65.731 | 5.0 | 1.8 | 18 km W from Sussex, NB |
| 2020-08-11 17:27:13 | 47.246 | -66.347 | 2.0 | 2.0 | 69 km SW from Bathurst, NB |
| 2020-09-20 00:41:47 | 45.830 | -65.990 | 5.0 | 1.8 | 35 km N from Hampton, NB |
| 2020-10-28 10:17:37 | 47.275 | -66.378 | 2.0 | 1.5 | 69 km SW from Bathurst, NB |

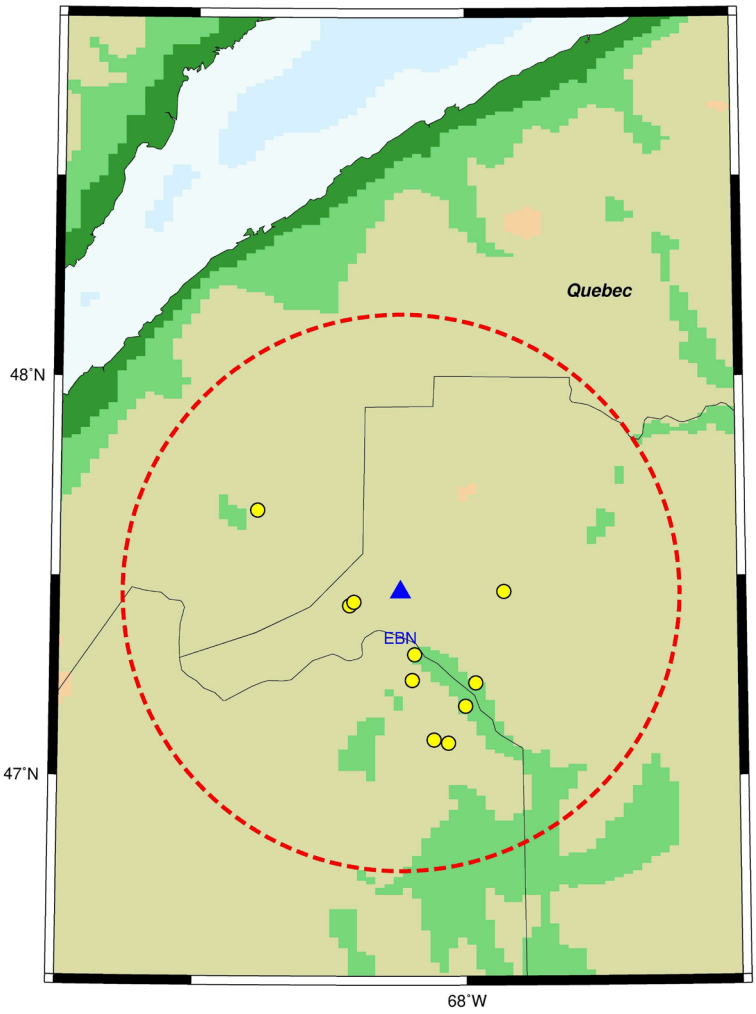
| | | | | | |
|---|---|---|---|---|---|
| 2020-11-02 23:34:05 | 47.285 | -66.312 | 5.0 | 2.3 | 64 km SW from Bathurst, NB |
| 2020-11-09 16:44:53 | 47.036 | -66.560 | 5.0 | 2.1 | 65 km E from Plaster Rock, NB |
| 2020-11-13 09:15:52 | 47.282 | -66.301 | 5.0 | 1.8 | 64 km SW from Bathurst, NB |
| 2020-11-16 06:37:41 | 46.494 | -65.391 | 5.0 | 1.7 | 27 km S from Rogersville, NB |
| 2020-12-02 18:14:42 | 45.999 | -65.615 | 5.0 | 1.8 | 32 km N from Sussex, NB |
| 2020-12-10 18:07:32 | 45.787 | -66.378 | 5.0 | 2.1 | 10 km SE from Oromocto, NB |

## Station CHEG



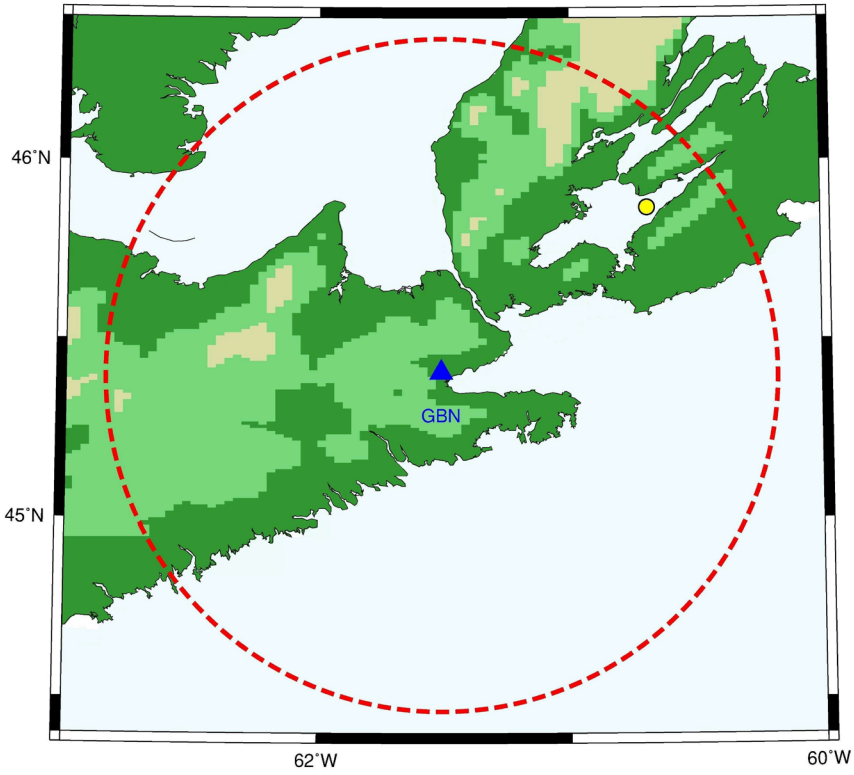

| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 2010-12-14 18:01:11 | 47.108 | -60.155 | 18.0 | 2.7 | 92 km S from Channel-Port aux Basques, NL |
| 2014-02-09 10:35:11 | 46.549 | -61.198 | 18.0 | 2.0 | 36 km N from Inverness, NS |
| 2017-07-19 09:14:14 | 46.416 | -60.721 | 18.0 | 1.6 | 43 km NW from Sydney Mines, NS |
| 2018-06-16 04:36:08 | 46.491 | -60.872 | 18.0 | 2.1 | 43 km NE from Inverness, NS |

## Station EBN



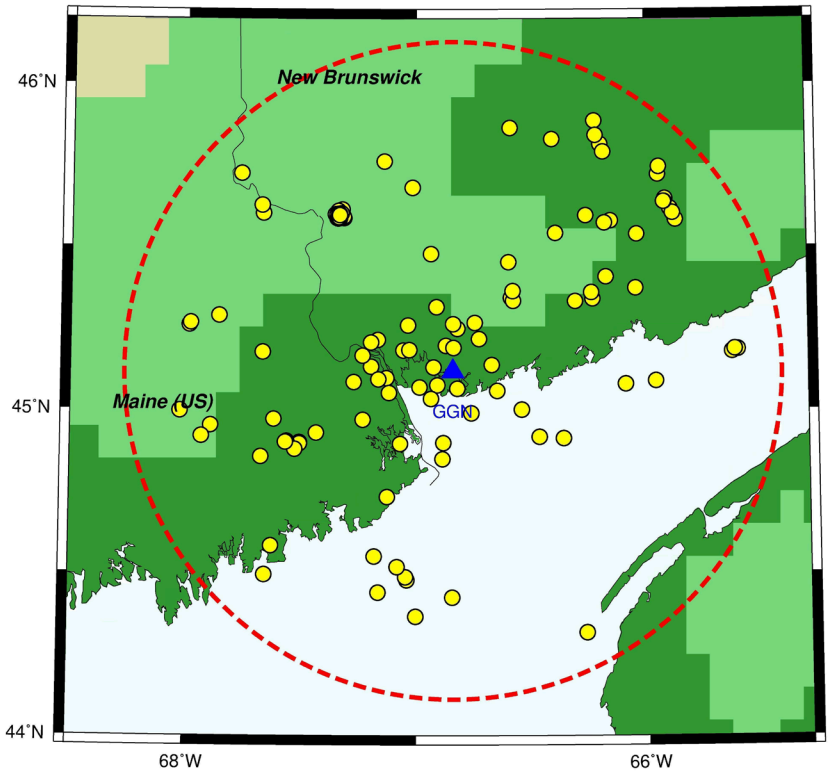

| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 1983-01-20 14:17:20 | 47.463 | -67.861 | 18.0 | 3.1 | KLN, TRQ AND LPQ NOT OPERATING |
| 1983-04-17 01:33:42 | 47.084 | -68.066 | 11.5 | 2.4 | 45 KM S FROM EDMUNDSTON, N.B. |
| 1983-11-28 11:01:31 | 47.176 | -68.002 | 18.0 | 2.1 | 40 KM SE FROM EDMUNDSTON, N.B. |
| 1984-01-16 00:43:21 | 47.091 | -68.118 | 4.0 | 1.8 | MAG (EPB) 1.8 MN(1 OBS) |
| 1984-04-12 11:54:05 | 47.234 | -67.965 | 18.0 | 2.4 | 35 KM SE FROM EDMUNDSTON, N.B. |
| 1987-10-01 18:39:50 | 47.428 | -68.429 | 18.0 | 1.8 | NEAR CABANO, QUE. |
| 1989-11-14 03:49:59 | 47.436 | -68.414 | 18.0 | 1.8 | NEAR EDMUNDSTON, N.B. |
| 1989-11-28 08:49:24 | 47.666 | -68.771 | 11.8 | 2.5 | TEMISCOUATA COUNTY, QUE. |
| 1990-03-21 03:57:29 | 47.305 | -68.190 | 18.0 | 2.0 | NORTHERN MAINE, U.S.A. |
| 1990-03-30 01:54:08 | 47.241 | -68.198 | 9.7 | 3.4 | NORTHERN MAINE, USA |

## Station GBN




| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 2019-04-05 06:46:08 | 45.868 | -60.691 | 18.0 | 2.8 | 54 km SW from Sydney Mines, NS |

## Station GGN



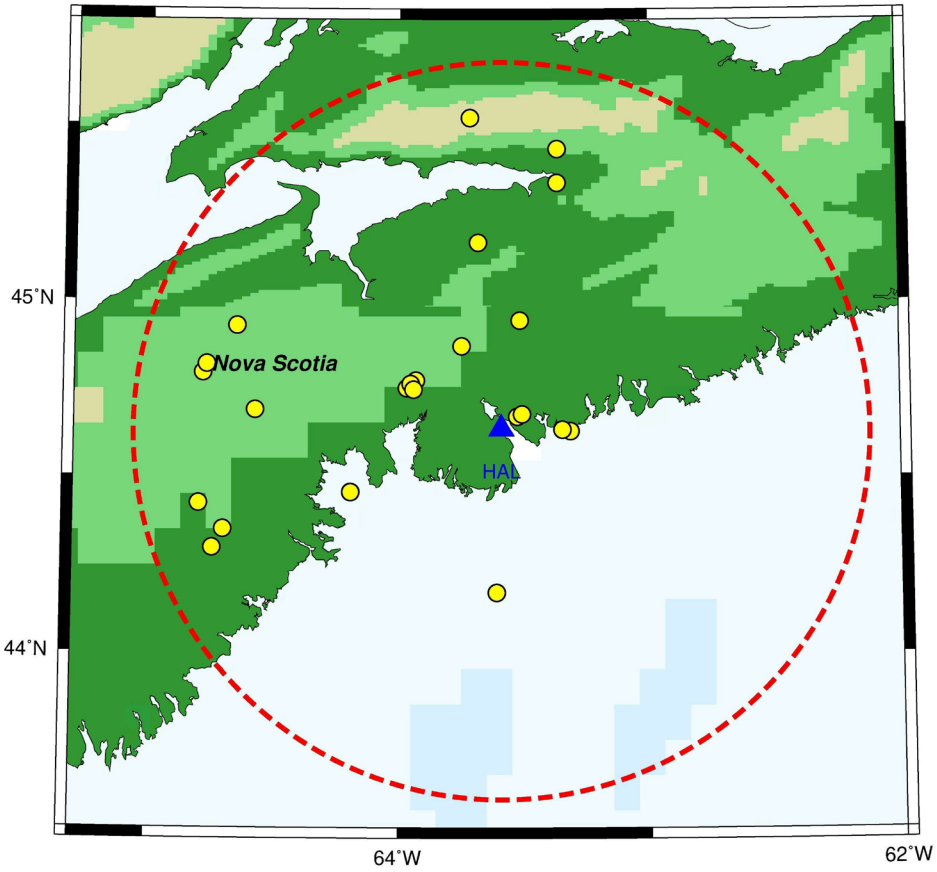

| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 2002-03-02 03:08:03 | 45.197 | -66.872 | 5.0 | 2.4 | 25 km SE from St. Stephen, N.B. |
| 2003-05-12 06:22:03 | 44.439 | -67.165 | 5.0 | 2.8 | 76 km S from ST.STEPHEN, N.B. |
| 2003-10-15 04:13:14 | 45.076 | -66.909 | 18.0 | 3.1 | 21 km E from ST.STEPHEN, N.B. |
| 2003-12-28 01:29:37 | 45.682 | -67.017 | 18.0 | 2.0 | 43 km SW from FREDERICTON, N.B. |
| 2004-11-02 22:50:41 | 45.583 | -65.871 | 5.0 | 2.7 | Hampton, NB |
| 2004-11-02 23:54:48 | 45.617 | -65.895 | 5.0 | 2.2 | Hampton, NB |
| 2004-11-16 09:35:47 | 44.952 | -67.892 | 5.0 | 2.1 | Maine, U.S. |
| 2004-12-16 17:00:55 | 45.647 | -65.917 | 5.0 | 2.6 | Hampton, NB. Felt. |
| 2005-01-25 00:04:47 | 45.604 | -65.884 | 5.0 | 2.4 | Hampton, NB. Felt. |
| 2005-06-26 02:13:57 | 45.580 | -66.156 | 5.0 | 2.2 | Hampton, NB |
| 2005-09-25 03:08:58 | 45.086 | -67.272 | 5.0 | 3.5 | 11 km S from St. Stephen, NB, Felt |
| 2006-07-21 09:47:35 | 45.334 | -66.310 | 5.0 | 2.3 | 23 km W from Saint John, NB |
| 2006-09-04 22:59:55 | 45.815 | -66.199 | 5.0 | 2.4 | 22 km E from Oromocto, NB |
| 2006-09-05 08:13:54 | 45.190 | -66.839 | 5.0 | 2.2 | 21 km NE from Saint Andrews, NB |
| 2006-10-13 23:45:12 | 45.001 | -66.543 | 5.0 | 2.0 | 40 km E from Saint Andrews, NB |
| 2007-04-20 14:44:25 | 44.920 | -67.931 | 5.0 | 2.1 | Maine, U.S. |
| 2007-05-24 09:57:26 | 45.315 | -66.913 | 5.0 | 2.2 | 28 km NE from Saint Andrews, NB |
| 2007-12-30 12:01:56 | 45.131 | -66.925 | 5.0 | 2.3 | Felt in the region of St. George, N.B. |
| 2008-01-23 13:39:44 | 45.215 | -67.168 | 5.0 | 2.2 | 11 km E from St. Stephen, NB. Felt |

| | | | | | |
|---|---|---|---|---|---|
| 2008-07-03 15:55:53 | 45.639 | -65.920 | 5.0 | 2.8 | 13 km NW from Hampton, NB |
| 2008-07-22 10:27:17 | 45.259 | -67.037 | 5.0 | 2.4 | 20 km N from Saint Andrews, NB |
| 2008-08-28 13:43:03 | 44.969 | -67.232 | 5.0 | 2.2 | 19 km SW from Saint Andrews, NB |
| 2009-02-28 16:32:17 | 45.267 | -66.746 | 5.0 | 2.1 | 33 km E from Saint Andrews, NB |
| 2009-06-08 03:55:06 | 45.726 | -67.764 | 5.0 | 2.2 | 39 km NW from McAdam, NB |
| 2009-07-01 03:51:18 | 44.896 | -67.070 | 18.0 | 2.4 | 21 km S from Saint Andrews, NB |
| 2009-08-03 07:35:15 | 44.917 | -66.466 | 18.0 | 2.0 | 51 km SW from Saint John, NB |
| 2009-11-07 22:33:50 | 45.639 | -65.922 | 5.0 | 2.2 | 13 km NW from Hampton, NB |
| 2009-11-08 21:28:02 | 45.596 | -66.262 | 5.0 | 2.3 | 23 km W from Hampton, NB. Felt |
| 2009-11-22 23:00:20 | 45.373 | -66.047 | 5.0 | 2.2 | 12 km N from Saint John, NB. Felt. |
| 2010-02-17 19:59:47 | 44.732 | -67.126 | 5.0 | 2.2 | 40 km S from Saint Andrews, NB |
| 2010-05-03 08:04:27 | 44.929 | -67.433 | 5.0 | 2.0 | 30 km S from St. Stephen, NB |
| 2010-06-17 22:21:17 | 44.989 | -66.762 | 5.0 | 2.3 | 19 km E from Saint Andrews, NB |
| 2010-06-29 09:08:59 | 45.059 | -66.650 | 5.0 | 2.1 | 33 km E from Saint Andrews, NB |
| 2010-07-25 18:36:25 | 44.424 | -66.846 | 5.0 | 3.2 | 75 km S from Saint Andrews, NB, Felt |
| 2010-07-29 18:35:06 | 44.856 | -67.674 | 5.0 | 2.7 | 47 km SW from St. Stephen, NB |
| 2010-08-25 08:16:02 | 45.034 | -66.937 | 5.0 | 2.4 | 11 km SE from Saint Andrews, NB. Felt. |
| 2010-11-14 17:05:09 | 45.831 | -66.409 | 5.0 | 2.3 | 6 km E from Oromocto, NB. Felt. |
| 2011-01-05 06:17:45 | 44.477 | -67.042 | 5.0 | 2.0 | 68 km S from Saint Andrews, NB |
| 2011-01-31 08:06:14 | 45.097 | -67.130 | 5.0 | 2.6 | 5 km W from Saint Andrews, NB |
| 2011-04-11 04:49:14 | 45.887 | -66.224 | 5.0 | 2.1 | 20 km E from Oromocto, NB |
| 2011-05-04 09:33:08 | 45.792 | -66.186 | 5.0 | 2.5 | 23 km E from Oromocto, NB |
| 2011-06-18 23:53:32 | 45.133 | -67.197 | 5.0 | 2.0 | 9 km SE from St. Stephen, NB |
| 2011-06-19 01:48:08 | 45.453 | -66.600 | 5.0 | 2.0 | 43 km S from Oromocto, NB |
| 2012-02-17 05:52:24 | 44.899 | -67.508 | 5.0 | 2.6 | 35 km SW from St. Stephen, NB |
| 2012-02-17 06:03:17 | 44.901 | -67.507 | 5.0 | 2.5 | 35 km SW from St. Stephen, NB |
| 2012-02-17 06:05:52 | 44.897 | -67.507 | 5.0 | 2.2 | 36 km SW from St. Stephen, NB. Aftershock |
| 2012-02-17 16:24:56 | 44.904 | -67.562 | 5.0 | 2.0 | 37 km SW from St. Stephen, NB |
| 2012-02-17 16:25:06 | 44.880 | -67.526 | 5.0 | 2.2 | 38 km SW from St. Stephen, NB |
| 2012-03-10 05:40:04 | 45.589 | -67.315 | 1.0 | 2.6 | 1 km W from McAdam, NB. Felt |
| 2012-03-13 06:28:45 | 45.599 | -67.332 | 1.0 | 2.0 | McAdam, NB. Felt. |
| 2012-03-13 06:44:04 | 45.589 | -67.345 | 1.0 | 2.1 | McAdam, NB. Felt. |
| 2012-03-23 15:36:51 | 45.593 | -67.321 | 0.0 | 2.1 | McAdam, NB |
| 2012-03-29 15:51:56 | 45.597 | -67.326 | 0.1 | 2.2 | McAdam, NB. Felt. |
| 2012-04-01 05:29:24 | 45.592 | -67.325 | 0.6 | 2.1 | McAdam, NB. Felt. |
| 2012-04-29 04:06:40 | 45.593 | -67.320 | 0.5 | 2.0 | McAdam, NB. Felt. |
| 2012-06-18 04:05:15 | 44.494 | -67.656 | 5.0 | 2.0 | Maine, U.S. |
| 2012-07-11 03:05:43 | 44.902 | -67.567 | 5.0 | 2.3 | Maine, U.S. |
| 2012-07-25 19:37:48 | 45.052 | -67.119 | 5.0 | 2.1 | 5 km SW from Saint Andrews, NB |
| 2012-08-07 03:02:42 | 45.249 | -66.823 | 5.0 | 2.6 | 26 km NE from Saint Andrews, NB. Felt |
| 2012-10-16 08:29:10 | 44.486 | -67.047 | 5.0 | 2.1 | 66 km S from Saint Andrews, NB |

| | | | | | |
|---|---|---|---|---|---|
| 2013-04-01 12:32:53 | 45.539 | -66.040 | 5.0 | 2.3 | 15 km W from Hampton, NB |
| 2013-09-28 10:32:11 | 44.972 | -67.618 | 5.0 | 2.0 | 34 km SW from St. Stephen, NB |
| 2013-12-15 03:13:19 | 45.865 | -66.592 | 5.0 | 2.3 | 9 km W from Oromocto, NB |
| 2013-12-27 20:09:53 | 45.138 | -66.674 | 5.0 | 2.1 | 31 km E from Saint Andrews, NB |
| 2013-12-28 20:09:40 | 45.263 | -66.841 | 5.0 | 2.3 | 26 km NE from Saint Andrews, NB |
| 2014-05-06 13:45:15 | 45.184 | -65.605 | 18.0 | 2.3 | 35 km E from Saint John, NB |
| 2014-05-06 13:45:15 | 45.178 | -65.629 | 5.0 | 2.3 | 33 km E from Saint John, NB |
| 2014-05-29 02:11:20 | 44.316 | -66.266 | 5.0 | 2.5 | 52 km SW from Digby, NS, Felt |
| 2014-07-17 04:54:27 | 45.479 | -66.937 | 5.0 | 2.8 | 32 km SE from McAdam, NB |
| 2014-09-17 13:21:54 | 45.065 | -66.823 | 5.0 | 2.6 | 19 km E from Saint Andrews, NB, felt |
| 2014-11-30 09:05:30 | 44.550 | -67.183 | 5.0 | 2.0 | 60 km S from Saint Andrews, NB |
| 2014-12-14 00:27:33 | 45.089 | -65.961 | 5.0 | 2.0 | 20 km S from Saint John, NB |
| 2015-02-17 10:49:15 | 45.183 | -67.056 | 5.0 | 2.5 | 11 km N from Saint Andrews, NB. Felt |
| 2015-04-22 16:42:13 | 45.093 | -67.165 | 5.0 | 2.0 | 8 km W from Saint Andrews, NB |
| 2015-04-25 22:06:47 | 45.344 | -66.590 | 5.0 | 2.1 | 44 km W from Saint John, NB |
| 2015-04-25 23:09:56 | 45.334 | -66.580 | 5.0 | 2.1 | 43 km W from Saint John, NB |
| 2015-05-27 11:25:40 | 44.997 | -68.024 | 5.0 | 2.2 | 61 km W from St. Stephen, NB |
| 2015-06-08 00:45:37 | 45.365 | -66.582 | 5.0 | 2.2 | 44 km W from Saint John, NB |
| 2015-07-16 00:32:36 | 45.167 | -67.234 | 5.0 | 2.0 | 5 km E from St. Stephen, NB |
| 2015-11-08 10:34:16 | 44.517 | -67.083 | 5.0 | 2.3 | 63 km S from Saint Andrews, NB |
| 2015-12-07 12:27:55 | 45.607 | -67.337 | 1.0 | 2.0 | 3 km NW from McAdam, NB. Felt |
| 2015-12-07 16:15:01 | 45.596 | -67.339 | 1.0 | 2.4 | 2 km W from McAdam, NB. Felt |
| 2015-12-07 19:44:58 | 45.598 | -67.335 | 1.0 | 2.1 | 2 km W from McAdam, NB. Felt |
| 2015-12-08 15:41:52 | 45.602 | -67.337 | 1.0 | 2.1 | 3 km NW from McAdam, NB. Felt |
| 2015-12-30 11:04:57 | 44.583 | -67.628 | 5.0 | 2.1 | 71 km S from St. Stephen, NB |
| 2016-02-02 11:56:22 | 44.849 | -66.886 | 1.5 | 3.6 | 30 km SE from Saint Andrews, NB. Felt |
| 2016-02-02 12:00:38 | 44.898 | -66.884 | 5.0 | 2.4 | 25 km SE from Saint Andrews, NB. |
| 2016-02-05 06:09:24 | 45.606 | -67.335 | 1.0 | 2.6 | 2 km NW from McAdam, NB. Felt |
| 2016-02-05 12:24:13 | 45.614 | -67.323 | 1.0 | 2.0 | 3 km NW from McAdam, NB. Felt |
| 2016-02-07 19:07:41 | 45.602 | -67.344 | 1.0 | 2.1 | 3 km W from McAdam, NB. Felt |
| 2016-02-08 09:43:36 | 45.611 | -67.339 | 1.0 | 2.7 | 3 km NW from McAdam, NB, Felt |
| 2016-02-08 17:16:07 | 45.592 | -67.317 | 1.0 | 2.0 | 1 km W from McAdam, NB. Felt |
| 2016-02-08 17:24:38 | 45.603 | -67.326 | 1.0 | 2.2 | 2 km NW from McAdam, NB. Felt |
| 2016-02-08 22:15:36 | 45.595 | -67.332 | 1.0 | 2.4 | 2 km W from McAdam, NB. Felt |
| 2016-02-08 22:29:45 | 45.599 | -67.338 | 1.0 | 2.5 | 2 km W from McAdam, NB. Felt |
| 2016-02-08 23:56:03 | 45.600 | -67.334 | 1.0 | 2.0 | 2 km W from McAdam, NB |
| 2016-02-09 00:24:57 | 45.600 | -67.353 | 0.8 | 3.3 | 4 km W from McAdam, NB. Felt |
| 2016-02-09 00:35:41 | 45.597 | -67.336 | 1.0 | 2.4 | 2 km W from McAdam, NB |
| 2016-02-09 00:52:03 | 45.601 | -67.338 | 1.0 | 2.4 | 3 km NW from McAdam, NB. Felt |
| 2016-02-09 03:35:15 | 45.599 | -67.346 | 1.0 | 2.1 | 3 km W from McAdam, NB. Felt |
| 2016-02-09 07:23:35 | 45.587 | -67.342 | 1.0 | 2.2 | 3 km W from McAdam, NB |

| | | | | | |
|---|---|---|---|---|---|
| 2016-02-09 08:16:58 | 45.589 | -67.335 | 1.0 | 2.0 | 2 km W from McAdam, NB |
| 2016-02-09 08:59:02 | 45.591 | -67.338 | 1.0 | 2.4 | 2 km W from McAdam, NB. Felt |
| 2016-03-02 02:27:24 | 45.217 | -66.729 | 5.0 | 2.3 | 30 km NE from Saint Andrews, NB |
| 2016-03-31 15:22:33 | 45.186 | -65.618 | 5.0 | 2.0 | 34 km E from Saint John, NB |
| 2016-06-14 18:11:36 | 45.079 | -66.091 | 5.0 | 2.1 | 20 km S from Saint John, NB |
| 2016-10-18 17:18:17 | 45.207 | -67.196 | 5.0 | 2.0 | 8 km E from St. Stephen, NB |
| 2016-11-04 03:52:54 | 45.261 | -67.985 | 5.0 | 2.0 | 55 km W from St. Stephen, NB |
| 2017-01-03 04:17:26 | 45.843 | -66.219 | 5.0 | 2.7 | 20 km E from Oromocto, NB |
| 2017-02-13 11:29:19 | 45.408 | -66.176 | 5.0 | 2.1 | 20 km NW from Saint John, NB |
| 2017-02-15 01:50:03 | 45.268 | -67.979 | 5.0 | 2.6 | 55 km W from St. Stephen, NB |
| 2017-07-01 16:17:57 | 45.289 | -67.856 | 5.0 | 2.5 | Maine, U.S. |
| 2017-07-26 13:29:37 | 45.184 | -67.030 | 5.0 | 2.4 | 11 km N from Saint Andrews, NB |
| 2018-01-05 13:27:47 | 45.543 | -66.396 | 2.0 | 2.1 | 33 km S from Oromocto, NB |
| 2018-03-01 12:39:28 | 44.365 | -67.003 | 5.0 | 2.4 | 80 km S from Saint Andrews, NB |
| 2018-03-14 22:19:48 | 45.341 | -66.235 | 2.0 | 2.9 | 18 km NW from Saint John, NB. Felt |
| 2018-03-27 04:52:44 | 45.599 | -67.337 | 0.6 | 2.6 | 2 km W from McAdam, NB. Felt |
| 2018-03-29 03:11:16 | 45.597 | -67.335 | 0.6 | 2.6 | 2 km W from McAdam, NB. Felt |
| 2018-05-16 23:04:09 | 44.913 | -66.363 | 5.0 | 2.3 | 46 km SW from Saint John, NB |
| 2018-09-19 16:07:54 | 45.177 | -67.667 | 5.0 | 2.1 | 29 km W from St. Stephen, NB |
| 2019-01-10 13:49:00 | 45.361 | -66.240 | 2.0 | 3.8 | 19 km NW from Saint John, NB. Felt |
| 2019-01-27 17:29:11 | 45.722 | -65.947 | 5.0 | 2.9 | 23 km N from Hampton, NB. Felt |
| 2019-03-14 10:54:56 | 45.746 | -65.942 | 5.0 | 2.0 | 25 km N from Hampton, NB |
| 2019-07-29 07:12:02 | 45.762 | -67.139 | 2.0 | 2.0 | 23 km NE from McAdam, NB |
| 2019-08-05 21:58:56 | 45.574 | -66.182 | 5.0 | 2.1 | 26 km W from Hampton, NB |
| 2019-10-26 02:49:05 | 45.604 | -67.667 | 2.0 | 2.0 | 28 km W from McAdam, NB |
| 2019-10-27 17:16:27 | 45.629 | -67.672 | 2.0 | 2.6 | 29 km W from McAdam, NB |
| 2019-11-04 20:52:05 | 45.069 | -66.987 | 5.0 | 2.5 | 6 km E from Saint Andrews, NB |

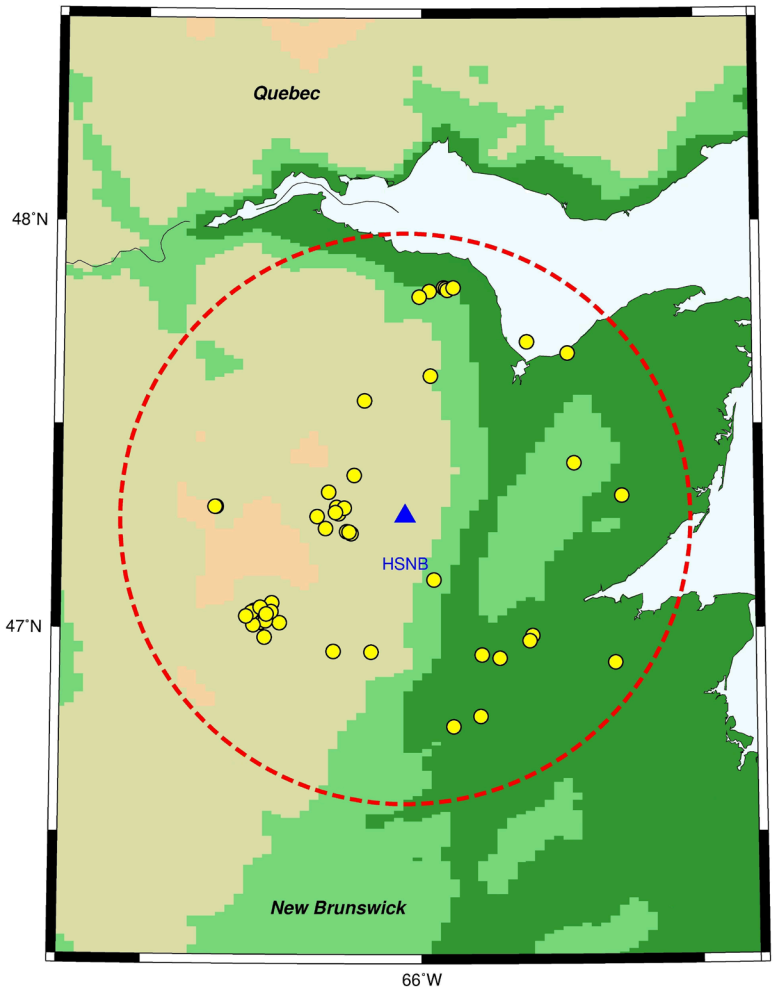
## Station HAL




| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 2003-06-30 05:13:57 | 44.945 | -63.517 | 18.0 | 1.7 | 27 km NE from BEDFORD, N.S. |
| 2006-10-01 21:30:57 | 44.930 | -64.649 | 5.0 | 2.3 | 15 km SE from Berwick, NS |
| 2007-06-11 14:55:07 | 44.351 | -64.700 | 5.0 | 2.8 | 15 km W from Bridgewater, NS |
| 2007-07-16 15:27:12 | 44.297 | -64.742 | 2.0 | 3.2 | Felt in Bridgewater, Pleasantville |
| 2007-12-11 06:19:52 | 44.425 | -64.799 | 18.0 | 1.7 | 23 km W from Bridgewater, NS |
| 2011-06-28 02:21:02 | 45.431 | -63.369 | 18.0 | 2.7 | 11 km NW from Truro, NS |
| 2013-10-02 03:32:56 | 44.691 | -64.576 | 18.0 | 1.8 | 23 km NW from Gold River 21, NS |
| 2013-12-05 06:36:32 | 45.165 | -63.687 | 18.0 | 1.8 | 26 km NW from Lantz, NS |
| 2014-04-07 00:36:52 | 45.520 | -63.720 | 5.0 | 1.6 | 26 km SE from Oxford, NS |
| 2015-08-04 02:41:54 | 45.336 | -63.370 | 5.0 | 2.2 | 9 km SW from Truro, NS |
| 2015-09-24 02:22:09 | 44.456 | -64.193 | 18.0 | 1.9 | 11 km S from Chester, NS |
| 2015-09-29 01:02:18 | 44.774 | -63.934 | 18.0 | 1.7 | 17 km W from Hammonds Plains Road, NS |
| 2015-09-29 03:28:39 | 44.752 | -63.969 | 18.0 | 1.9 | 19 km W from Hammonds Plains Road, NS |
| 2015-09-29 03:51:56 | 44.764 | -63.955 | 18.0 | 1.8 | 18 km W from Hammonds Plains Road, NS |
| 2017-01-12 21:11:47 | 44.630 | -63.316 | 18.0 | 2.7 | 23 km E from Halifax, NS. Felt |
| 2017-01-12 22:35:20 | 44.635 | -63.347 | 18.0 | 2.1 | 20 km E from Halifax, NS. Aftershock. Felt |
| 2018-02-15 09:42:54 | 44.872 | -63.750 | 2.0 | 1.7 | 17 km N from Hammonds Plains Road, NS |

| | | | | | |
|---|---|---|---|---|---|
| 2018-09-05 01:17:19 | 44.748 | -63.943 | 18.0 | 2.5 | 17 km W from Hammonds Plains Road, NS |
| 2019-12-12 09:56:21 | 44.170 | -63.611 | 5.0 | 2.6 | 53 km S from Halifax, NS |
| 2020-03-02 00:38:44 | 44.672 | -63.528 | 2.0 | 2.4 | 6 km NE from Halifax, NS. Felt |
| 2020-03-03 04:42:11 | 44.678 | -63.510 | 2.0 | 2.6 | 8 km NE from Halifax, NS. Felt |
| 2020-09-16 03:08:04 | 44.796 | -64.784 | 5.0 | 1.8 | 25 km SE from Kingston, NS |
| 2020-09-19 05:06:54 | 44.821 | -64.769 | 5.0 | 2.1 | 23 km SE from Kingston, NS |

## Station HSNB




| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 2017-10-22 05:28:26 | 47.015 | -66.583 | 5.0 | 2.1 | 63 km E from Plaster Rock, NB |
| 2017-11-25 11:37:58 | 47.026 | -66.600 | 5.0 | 2.0 | 62 km E from Plaster Rock, NB |
| 2018-01-04 00:27:30 | 47.234 | -66.256 | 5.0 | 2.2 | 64 km SW from Bathurst, NB |
| 2018-03-14 11:29:14 | 46.943 | -66.183 | 2.0 | 2.4 | 55 km W from Miramichi, NB |
| 2018-03-17 23:13:30 | 47.038 | -66.596 | 5.0 | 2.0 | 62 km E from Plaster Rock, NB |
| 2018-03-28 21:31:08 | 47.237 | -66.262 | 2.0 | 1.9 | 64 km SW from Bathurst, NB |
| 2018-04-02 11:07:37 | 47.014 | -66.512 | 5.0 | 2.0 | 68 km E from Plaster Rock, NB |
| 2018-04-22 03:18:12 | 46.684 | -66.649 | 2.0 | 2.3 | 62 km SE from Plaster Rock, NB |
| 2018-04-22 21:35:49 | 47.044 | -66.603 | 5.0 | 2.8 | 62 km E from Plaster Rock, NB |
| 2018-05-21 03:47:24 | 47.019 | -66.562 | 5.0 | 2.0 | 64 km E from Plaster Rock, NB |
| 2018-07-21 01:31:32 | 46.535 | -65.914 | 5.0 | 1.9 | 43 km SW from Rogersville, NB |
| 2018-08-25 02:59:35 | 47.298 | -66.308 | 2.0 | 2.1 | 63 km SW from Bathurst, NB |
| 2018-11-17 09:32:49 | 47.326 | -65.277 | 5.0 | 2.3 | 34 km SW from Tracadie-Sheila, NB |
| 2018-12-24 18:51:26 | 47.676 | -65.471 | 5.0 | 2.9 | 13 km NE from Bathurst, NB. Felt |

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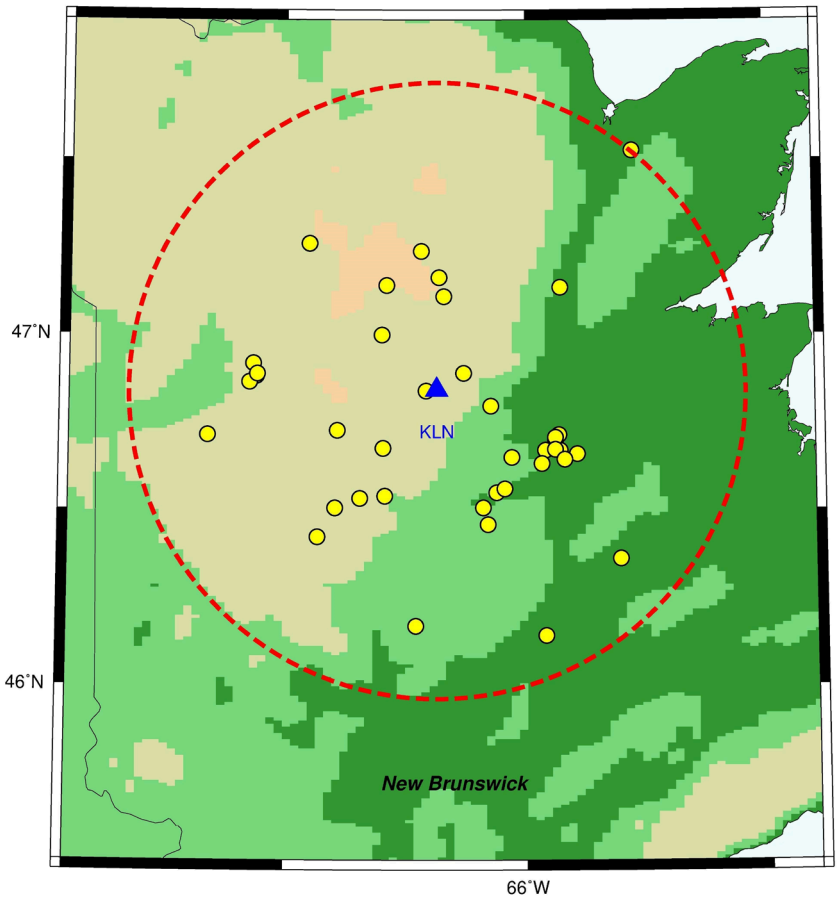
|---|---|---|---|---|---|
| 2018-12-29 07:47:33 | 47.299 | -66.743 | 2.0 | 3.1 | 54 km SE from Saint-Quentin, NB |
| 2018-12-29 08:59:21 | 47.299 | -66.747 | 2.0 | 2.6 | 54 km SE from Saint-Quentin, NB |
| 2019-01-18 07:49:16 | 46.983 | -65.602 | 2.0 | 2.4 | 11 km W from Miramichi, NB. Felt |
| 2019-02-11 16:26:52 | 46.551 | -65.819 | 5.0 | 2.7 | 36 km SW from Rogersville, NB |
| 2019-03-02 06:10:20 | 47.009 | -66.607 | 5.0 | 2.5 | 61 km E from Plaster Rock, NB |
| 2019-03-04 03:17:00 | 46.749 | -65.028 | 5.0 | 2.1 | 14 km NW from Richibucto, NB |
| 2019-03-05 18:20:30 | 46.944 | -66.319 | 5.0 | 2.6 | 65 km W from Miramichi, NB |
| 2019-03-07 03:17:54 | 46.970 | -65.612 | 2.0 | 3.0 | 12 km W from Miramichi, NB. Felt |
| 2019-03-25 05:06:29 | 47.040 | -66.613 | 5.0 | 2.2 | 61 km E from Plaster Rock, NB |
| 2019-04-30 13:56:02 | 47.030 | -66.633 | 5.0 | 2.2 | 59 km E from Plaster Rock, NB |
| 2019-05-03 18:47:44 | 47.063 | -66.540 | 5.0 | 1.9 | 67 km E from Plaster Rock, NB |
| 2019-07-04 22:33:28 | 46.928 | -65.719 | 5.0 | 1.9 | 21 km SW from Miramichi, NB |
| 2019-07-15 12:47:23 | 47.837 | -65.920 | 5.0 | 3.7 | 16 km W from Petit Rocher, NB. Felt |
| 2019-07-15 15:44:04 | 47.835 | -65.913 | 5.0 | 3.4 | 15 km W from Petit Rocher, NB. Felt |
| 2019-07-15 16:06:16 | 47.828 | -65.972 | 5.0 | 2.5 | 19 km W from Petit Rocher, NB. Aftershock |
| 2019-07-25 22:38:22 | 47.831 | -65.907 | 5.0 | 2.5 | 15 km W from Petit Rocher, NB |
| 2019-07-26 01:41:14 | 47.837 | -65.885 | 5.0 | 2.3 | 14 km NW from Petit Rocher, NB |
| 2019-07-26 12:15:35 | 46.759 | -65.886 | 2.0 | 2.3 | 35 km W from Rogersville, NB |
| 2019-09-05 05:21:21 | 47.560 | -66.208 | 2.0 | 1.9 | 44 km SW from Petit Rocher, NB |
| 2019-11-11 18:40:04 | 46.590 | -66.290 | 5.0 | 1.9 | 68 km W from Rogersville, NB |
| 2019-12-05 18:24:52 | 46.785 | -65.789 | 5.0 | 2.1 | 28 km W from Rogersville, NB |
| 2019-12-17 04:32:16 | 47.407 | -65.449 | 5.0 | 1.9 | 28 km SE from Bathurst, NB |
| 2019-12-20 10:06:04 | 47.042 | -66.543 | 5.0 | 2.1 | 66 km E from Plaster Rock, NB |
| 2020-01-19 09:51:50 | 46.917 | -65.304 | 5.0 | 1.9 | 16 km SE from Miramichi, NB |
| 2020-02-14 00:41:38 | 47.621 | -65.968 | 2.0 | 2.3 | 26 km W from Bathurst, NB |
| 2020-02-28 06:43:55 | 47.052 | -66.582 | 5.0 | 2.3 | 64 km E from Plaster Rock, NB |
| 2020-02-28 11:52:22 | 47.377 | -66.244 | 5.0 | 2.2 | 54 km SW from Bathurst, NB |
| 2020-03-05 07:28:15 | 47.704 | -65.619 | 5.0 | 2.4 | 7 km E of Beresford, NB |
| 2020-04-21 04:33:29 | 47.296 | -66.280 | 2.0 | 1.9 | 61 km SW from Bathurst, NB |
| 2020-05-23 12:10:30 | 47.815 | -66.009 | 5.0 | 2.2 | 22 km W from Petit Rocher, NB |
| 2020-06-18 15:46:10 | 46.979 | -66.567 | 5.0 | 2.4 | 63 km E from Plaster Rock, NB |
| 2020-07-04 00:07:50 | 47.335 | -66.337 | 2.0 | 2.0 | 63 km SW from Bathurst, NB |
| 2020-07-21 15:33:16 | 46.936 | -65.784 | 5.0 | 2.2 | 25 km W from Miramichi, NB |
| 2020-08-11 17:27:13 | 47.246 | -66.347 | 2.0 | 2.0 | 69 km SW from Bathurst, NB |
| 2020-11-02 23:34:05 | 47.285 | -66.312 | 5.0 | 2.3 | 64 km SW from Bathurst, NB |
| 2020-11-09 16:44:53 | 47.036 | -66.560 | 5.0 | 2.1 | 65 km E from Plaster Rock, NB |

## Station KLN




| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 1985-01-15 06:46:14 | 46.168 | -66.457 | 5.0 | 2.6 | 30 KM NE FROM FREDERICTON, N.B. |
| 1985-01-15 20:11:04 | 47.000 | -66.600 | 5.0 | 2.4 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-01-23 06:10:01 | 47.000 | -66.600 | 5.0 | 2.2 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-01-23 09:39:54 | 47.000 | -66.600 | 5.0 | 1.9 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-01-28 04:26:01 | 47.136 | -65.858 | 5.0 | 2.6 | FELT AT NEWCASTLE, N.B. |
| 1985-02-09 01:35:54 | 47.000 | -66.600 | 5.0 | 2.0 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-02-13 19:24:55 | 47.000 | -66.600 | 5.0 | 2.3 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-02-23 19:12:01 | 47.000 | -66.600 | 5.0 | 2.6 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-03-13 12:35:11 | 46.142 | -65.920 | 18.0 | 2.3 | 90 KM SE FROM MCKENDRICK L., N.B. |
| 1985-05-12 08:30:31 | 47.000 | -66.600 | 5.0 | 2.3 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-05-13 18:46:19 | 47.000 | -66.600 | 5.0 | 2.8 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-05-18 15:20:26 | 47.000 | -66.600 | 5.0 | 2.6 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-05-24 07:44:06 | 47.000 | -66.600 | 5.0 | 2.2 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-05-24 07:44:32 | 47.000 | -66.600 | 5.0 | 2.2 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-05-25 07:16:15 | 47.000 | -66.600 | 5.0 | 1.7 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-05-26 17:14:16 | 46.539 | -66.587 | 18.0 | 1.7 | 35 KM SW FROM MCKENDRICK L., N.B. |

| | | | | | |
|---|---|---|---|---|---|
| 1985-05-31 17:54:38 | 47.000 | -66.600 | 5.0 | 1.8 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-06-04 16:00:54 | 47.000 | -66.600 | 5.0 | 1.7 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-06-09 17:04:27 | 47.000 | -66.600 | 5.0 | 2.7 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-06-22 09:48:07 | 47.000 | -66.600 | 5.0 | 2.5 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-06-24 20:25:06 | 47.000 | -66.600 | 5.0 | 2.2 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-07-03 13:54:49 | 47.000 | -66.600 | 5.0 | 2.8 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-07-07 10:35:58 | 47.000 | -66.600 | 5.0 | 1.7 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-07-13 07:30:08 | 47.000 | -66.600 | 5.0 | 2.1 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-08-18 17:00:56 | 47.000 | -66.600 | 5.0 | 2.1 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-08-21 14:00:45 | 47.000 | -66.600 | 5.0 | 2.3 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-08-23 11:33:45 | 47.000 | -66.600 | 5.0 | 2.7 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-08-27 13:51:58 | 47.000 | -66.600 | 5.0 | 1.6 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-09-06 09:52:46 | 47.000 | -66.600 | 5.0 | 2.2 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-09-23 14:46:44 | 47.000 | -66.600 | 5.0 | 1.9 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-10-02 22:58:19 | 46.714 | -67.322 | 18.0 | 2.6 | 70 KM W FROM MCKENDRICK L., N.B. |
| 1985-10-05 05:34:13 | 47.000 | -66.600 | 5.0 | 3.9 | FELT IN BATHURST,N.B |
| 1985-10-05 06:17:33 | 47.000 | -66.600 | 5.0 | 2.8 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-10-15 12:25:58 | 47.000 | -66.600 | 5.0 | 2.0 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-10-17 05:36:47 | 47.000 | -66.600 | 5.0 | 2.1 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-10-21 15:45:55 | 47.000 | -66.600 | 5.0 | 2.9 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-11-12 13:09:09 | 47.000 | -66.600 | 5.0 | 2.3 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1985-12-21 06:03:11 | 47.000 | -66.600 | 5.0 | 3.1 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-01-10 14:32:33 | 47.000 | -66.600 | 5.0 | 2.4 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-01-16 14:22:54 | 47.000 | -66.600 | 10.0 | 2.4 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-01-21 02:32:26 | 47.000 | -66.600 | 5.0 | 3.4 | SMALL FORESHOCK 19 S EARLIER |
| 1986-03-06 08:34:51 | 47.000 | -66.600 | 5.0 | 3.4 | FELT IN BATHURST, N.B. |
| 1986-03-16 05:01:47 | 47.000 | -66.600 | 5.0 | 2.8 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-03-31 19:25:59 | 47.000 | -66.600 | 5.0 | 2.5 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-04-13 10:05:54 | 47.000 | -66.600 | 5.0 | 2.2 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-05-09 09:04:32 | 46.549 | -66.124 | 18.0 | 3.3 | FELT IN DOAKTOWN, N.B. |
| 1986-05-22 03:41:47 | 47.000 | -66.600 | 5.0 | 2.1 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-06-01 14:53:14 | 47.000 | -66.600 | 5.0 | 3.4 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-06-09 01:06:46 | 47.000 | -66.600 | 5.0 | 1.7 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-07-21 18:28:08 | 46.560 | -66.090 | 18.0 | 2.3 | 40 KM SE FROM MCKENDRICK L., N.B. |
| 1986-08-28 00:25:07 | 47.000 | -66.600 | 5.0 | 1.6 | 25 KM NW FROM MCKENDRICK L., N.B. |
| 1986-09-14 16:49:32 | 46.890 | -66.260 | 5.0 | 2.3 | 10 KM NE FROM MCKENDRICK L., N.B. |
| 1986-09-24 11:05:37 | 46.700 | -65.880 | 18.0 | 2.3 | NEAR BLACKVILLE, N.B. |
| 1986-09-28 15:09:41 | 46.670 | -65.860 | 18.0 | 2.0 | EVENT SIMILAR TO SEPT 24 |
| 1986-10-03 02:28:59 | 46.715 | -65.865 | 18.0 | 1.7 | NEAR BLACKVILLE, N.B. |
| 1986-10-17 14:47:59 | 47.000 | -66.600 | 5.0 | 4.1 | FELT IN BATHURST,N.B. |
| 1986-10-17 15:02:55 | 47.000 | -66.600 | 5.0 | 2.3 | AFTERSHOCK MIRAMICHI, N.B. |

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|---|---|---|---|---|---|
| 1986-10-17 15:17:04 | 47.000 | -66.600 | 5.0 | 1.7 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-17 15:32:53 | 47.000 | -66.600 | 5.0 | 2.1 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-18 12:24:30 | 47.000 | -66.600 | 5.0 | 2.8 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-18 12:33:48 | 47.000 | -66.600 | 5.0 | 2.4 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-18 12:35:28 | 47.000 | -66.600 | 5.0 | 2.5 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-18 15:46:29 | 47.000 | -66.600 | 5.0 | 2.7 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-18 16:10:43 | 47.000 | -66.600 | 5.0 | 2.1 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-19 02:16:22 | 47.000 | -66.600 | 5.0 | 2.3 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-19 18:14:00 | 47.000 | -66.600 | 5.0 | 1.9 | AFTERSHOCK MIRAMICHI, N.B. |
| 1986-10-23 12:58:04 | 47.000 | -66.600 | 5.0 | 3.4 | MAG MC=3.4 (MIT) |
| 1986-10-28 16:48:13 | 47.000 | -66.600 | 5.0 | 3.4 | FELT IN BATHURST, N.B. MC=3.1 (MIT) |
| 1986-11-05 06:45:13 | 47.000 | -66.600 | 5.0 | 2.6 | FORESHOCK 10 SEC EARLIER MAG 2.4 |
| 1987-03-12 05:49:08 | 46.670 | -65.920 | 18.0 | 2.2 | NEAR BLACKVILLE, N.B. |
| 1987-03-12 13:58:09 | 46.707 | -65.879 | 18.0 | 1.6 | NEAR BLACKVILLE, N.B. |
| 1987-04-22 14:32:53 | 47.000 | -66.600 | 5.0 | 2.8 | NOT REPORTED FELT MIRAMICHI, N.B. |
| 1987-04-23 04:02:21 | 46.533 | -66.690 | 18.0 | 1.9 | WEST OF BOIESTOWN, N.B. |
| 1987-06-05 02:51:03 | 46.797 | -66.147 | 18.0 | 1.7 | BLACKVILLE REGION, N.B. |
| 1987-06-28 15:08:40 | 47.141 | -66.581 | 5.0 | 2.5 | NORTH OF MIRAMICHI REGION, N.B. |
| 1987-08-06 09:44:28 | 46.727 | -66.784 | 18.0 | 1.5 | WEST OF BOIESTOWN, N.B. |
| 1987-09-18 04:43:38 | 47.000 | -66.600 | 5.0 | 2.3 | FORESHOCK (MAG <2.0) AT 04:31 |
| 1987-11-18 18:11:11 | 47.239 | -66.437 | 5.0 | 2.2 | NORTH OF THE MIRAMICHI ZONE |
| 1987-12-19 09:58:58 | 47.000 | -66.600 | 5.0 | 2.6 | UNLOCATED FORESHOCK 06:08 |
| 1988-01-08 23:45:54 | 47.000 | -66.600 | 5.0 | 2.6 | MIRAMICHI, N.B. |
| 1988-01-09 02:38:45 | 47.000 | -66.600 | 5.0 | 1.5 | MIRAMICHI, N.B. |
| 1988-01-16 20:52:06 | 47.000 | -66.600 | 5.0 | 1.6 | MIRAMICHI, N.B. |
| 1988-01-17 19:08:17 | 47.000 | -66.600 | 5.0 | 1.5 | MIRAMICHI, N.B. |
| 1988-02-24 15:11:28 | 46.507 | -66.179 | 18.0 | 1.8 | CENTRAL N.B. |
| 1988-03-06 18:13:17 | 47.000 | -66.600 | 5.0 | 3.2 | NOT REPORTED FELT MIRAMICHI, N.B. |
| 1988-03-06 19:13:23 | 47.000 | -66.600 | 5.0 | 2.0 | AFTERSHOCK MIRAMICHI, N.B. |
| 1988-03-08 02:38:17 | 47.000 | -66.600 | 5.0 | 2.2 | MIRAMICHI, N.B. |
| 1988-03-08 02:54:09 | 47.000 | -66.600 | 5.0 | 1.8 | MIRAMICHI, N.B. |
| 1988-03-08 03:04:09 | 47.000 | -66.600 | 5.0 | 2.2 | MIRAMICHI, N.B. |
| 1988-03-08 09:16:57 | 47.000 | -66.600 | 5.0 | 1.9 | MIRAMICHI, N.B. |
| 1988-03-09 02:12:45 | 47.000 | -66.600 | 5.0 | 1.9 | MIRAMICHI, N.B. |
| 1988-03-09 03:50:20 | 47.000 | -66.600 | 5.0 | 1.8 | MIRAMICHI, N.B. |
| 1988-03-24 02:28:32 | 47.000 | -66.600 | 5.0 | 2.0 | MIRAMICHI, N.B. |
| 1988-04-06 01:03:04 | 47.109 | -66.342 | 18.0 | 2.0 | NORTHEAST OF MIRAMICHI, N.B. |
| 1988-04-12 08:09:37 | 46.673 | -65.880 | 18.0 | 2.0 | NEAR UPPER BLACKVILLE, N.B. |
| 1988-05-09 01:23:03 | 47.000 | -66.600 | 5.0 | 3.5 | MIRAMICHI, N.B. |
| 1988-05-24 15:55:41 | 47.000 | -66.600 | 5.0 | 1.6 | MIRAMICHI, N.B. |
| 1988-07-27 00:43:59 | 47.526 | -65.555 | 18.0 | 2.8 | NORTHEASTERN N.B. |

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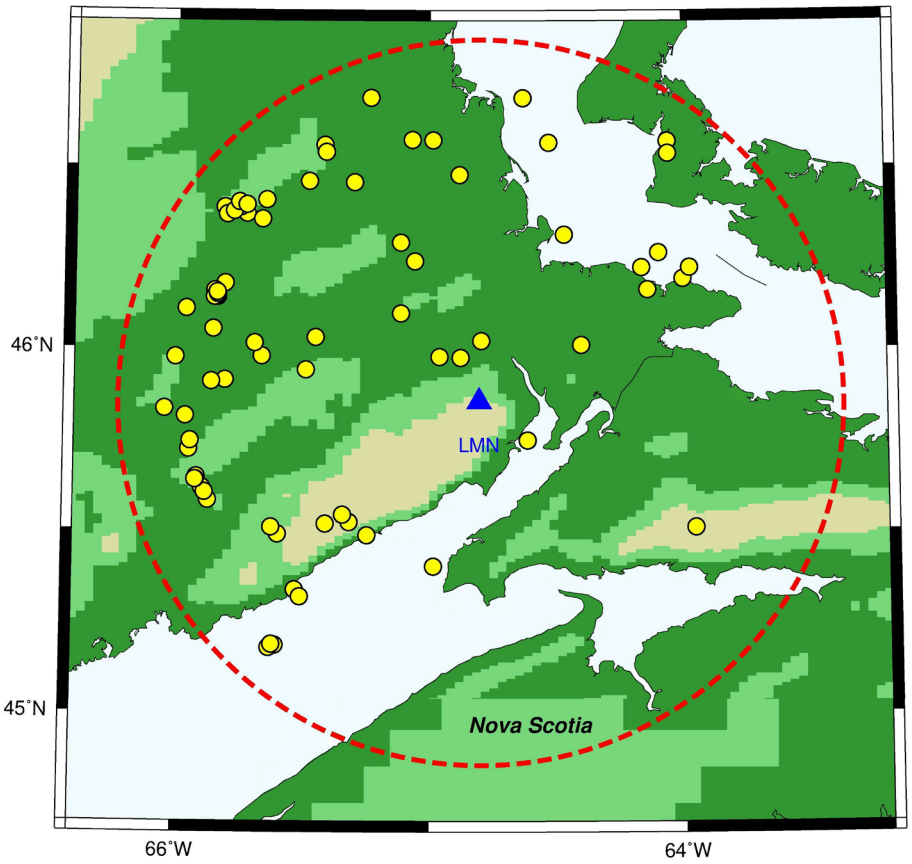
|---|---|---|---|---|---|
| 1988-07-27 00:46:05 | 47.526 | -65.555 | 18.0 | 2.6 | AFTERSHOCK |
| 1988-08-26 05:59:10 | 47.000 | -66.600 | 5.0 | 3.8 | MIRAMICHI, N.B. |
| 1988-12-22 03:46:56 | 46.883 | -67.122 | 18.0 | 1.8 | STANLEY MOUNTAIN, CENTRAL N.B. |
| 1988-12-22 12:36:08 | 46.919 | -67.134 | 5.0 | 2.2 | STANLEY MOUNTAIN, CENTRAL N.B. |
| 1988-12-22 19:49:12 | 46.865 | -67.149 | 5.0 | 2.1 | STANLEY MOUNTAIN REGION, |
| 1988-12-23 04:58:48 | 46.423 | -66.866 | 5.0 | 1.5 | STANLEY MTN REGION, CENTRAL N.B. |
| 1988-12-24 12:30:03 | 47.000 | -66.600 | 5.0 | 1.7 | MIRAMICHI, N.B. |
| 1988-12-26 08:22:34 | 47.000 | -66.600 | 5.0 | 2.2 | MIRAMICHI, N.B. |
| 1989-01-01 06:10:16 | 46.889 | -67.117 | 18.0 | 1.9 | STANLEY MTN REGION, N.B. |
| 1989-01-16 02:33:55 | 47.000 | -66.600 | 5.0 | 3.0 | NOT REPORTED FELT MIRAMICHI, N.B. |
| 1989-01-16 03:03:14 | 47.000 | -66.600 | 5.0 | 2.5 | AFTERSHOCK MIRAMICHI, N.B. |
| 1989-02-09 18:04:46 | 47.000 | -66.600 | 5.0 | 2.2 | MIRAMICHI, N.B. |
| 1989-06-10 10:39:49 | 47.000 | -66.600 | 5.0 | 2.8 | MIRAMICHI, N.B. NOT REPORTED FELT |
| 1989-08-10 21:17:42 | 46.660 | -65.788 | 5.0 | 3.5 | EAST OF BLACKVILLE, N.B. |
| 1989-08-26 04:42:17 | 46.362 | -65.611 | 18.0 | 2.2 | S.E. NEW BRUNSWICK |
| 1989-10-21 02:33:38 | 46.676 | -66.594 | 18.0 | 1.6 | CENTRAL N.B. |
| 1989-10-26 06:29:33 | 47.000 | -66.600 | 5.0 | 1.9 | MIRAMICHI REGION, N.B. |
| 1990-01-08 21:40:25 | 47.261 | -66.903 | 5.0 | 3.0 | 84 KM S OF CAMPBELLTON, N.B. |
| 1990-02-07 01:01:56 | 47.163 | -66.363 | 18.0 | 2.4 | NORTHCENTRAL N.B. |
| 1990-03-21 21:33:29 | 46.458 | -66.159 | 18.0 | 2.1 | CENTRAL N.B. |
| 1990-03-30 09:31:30 | 47.000 | -66.600 | 5.0 | 2.1 | MIRAMICHI, N.B. |
| 1990-05-28 02:35:21 | 46.644 | -65.841 | 18.0 | 2.3 | NEAR BLACKVILLE, CENTRAL N.B. |
| 1990-05-28 18:22:51 | 46.506 | -66.794 | 18.0 | 3.2 | 25 KM N OF STANLEY, N.B. |
| 1990-06-16 13:48:05 | 47.000 | -66.600 | 5.0 | 3.0 | MIRAMICHI, N.B. |
| 1990-07-25 00:06:47 | 47.000 | -66.600 | 5.0 | 2.2 | MIRAMICHI, N.B. |
| 1990-09-22 16:34:08 | 46.650 | -66.061 | 18.0 | 2.1 | BLACKVILLE REGION, N.B. |
| 1990-12-12 05:15:07 | 47.000 | -66.600 | 5.0 | 3.5 | MIRAMICHI, N.B. |
| 1991-02-06 20:51:42 | 46.632 | -65.936 | 18.0 | 2.4 | CENTRAL N.B. |
| 1991-02-24 12:57:40 | 46.840 | -66.416 | 18.0 | 1.6 | MIRAMICHI AREA, N.B. |

## Station LMN




| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 1994-06-04 07:59:14 | 45.747 | -64.616 | 18.0 | 2.4 | ABOUT 27 KM S OF MONCTON, N.B. |
| 1996-03-24 08:29:44 | 46.456 | -65.300 | 18.0 | 2.2 | 56 km NW from MONCTON, N.B. |
| 1996-04-17 22:01:09 | 45.976 | -64.963 | 18.0 | 2.1 | 20 km SW from MONCTON, N.B. |
| 2001-09-09 07:05:46 | 46.688 | -64.633 | 5.0 | 2.0 | 62 km N from Moncton, N.B. |
| 2002-07-09 07:16:24 | 46.407 | -65.646 | 5.0 | 2.2 | 65 km S from Miramichi City, N.B. |
| 2002-12-21 18:12:26 | 46.239 | -65.059 | 5.0 | 2.6 | 27 km NW from Moncton, N.B. |
| 2003-06-26 06:25:00 | 46.572 | -65.070 | 18.0 | 2.2 | 57 km NW from MONCTON, N.B. |
| 2004-08-26 08:14:48 | 46.191 | -64.002 | 18.0 | 2.0 | 29 km SW from Summerside, PE |
| 2004-09-27 21:25:29 | 45.401 | -64.986 | 5.0 | 2.2 | Bay of Fundy. |
| 2004-11-02 22:50:41 | 45.583 | -65.871 | 5.0 | 2.7 | Hampton, NB |
| 2004-11-02 23:54:48 | 45.617 | -65.895 | 5.0 | 2.2 | Hampton, NB |
| 2004-12-16 17:00:55 | 45.647 | -65.917 | 5.0 | 2.6 | Hampton, NB. Felt. |
| 2005-01-25 00:04:47 | 45.604 | -65.884 | 5.0 | 2.4 | Hampton, NB. Felt. |
| 2005-03-11 17:32:09 | 46.558 | -65.417 | 5.0 | 2.2 | 20 km S from Rogersville, NB |
| 2005-03-11 17:40:36 | 46.539 | -65.411 | 5.0 | 2.2 | 22 km S from Rogersville, NB |
| 2005-06-05 08:51:37 | 46.688 | -65.235 | 5.0 | 2.1 | 16 km E from Rogersville, NB |
| 2006-05-28 12:49:11 | 46.387 | -65.813 | 5.0 | 2.0 | 49 km SW from Rogersville, NB |

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|---|---|---|---|---|---|
| 2006-08-21 02:16:43 | 46.370 | -65.724 | 5.0 | 2.0 | 45 km SW from Rogersville, NB |
| 2006-09-09 07:25:47 | 45.336 | -65.528 | 5.0 | 2.6 | 33 km SE from Hampton, NB |
| 2006-09-14 13:35:41 | 46.367 | -65.803 | 5.0 | 2.0 | 53 km SW from Rogersville, NB |
| 2006-09-14 17:55:51 | 46.387 | -65.749 | 5.0 | 2.3 | 45 km SW from Rogersville, NB |
| 2006-09-24 20:08:56 | 46.377 | -65.774 | 5.0 | 2.2 | 48 km SW from Rogersville, NB |
| 2007-10-07 18:37:39 | 45.978 | -65.663 | 5.0 | 2.3 | 31 km NW from Sussex, NB |
| 2008-05-13 23:44:11 | 45.913 | -65.807 | 5.0 | 2.8 | 31 km NW from Sussex, NB |
| 2008-07-03 15:55:53 | 45.639 | -65.920 | 5.0 | 2.8 | 13 km NW from Hampton, NB |
| 2008-08-15 12:43:18 | 45.833 | -66.043 | 5.0 | 2.4 | 34 km E from Oromocto, NB |
| 2008-10-18 17:50:13 | 45.508 | -63.956 | 5.0 | 2.2 | 17 km SE from Springhill, NS |
| 2009-11-07 22:33:50 | 45.639 | -65.922 | 5.0 | 2.2 | 13 km NW from Hampton, NB |
| 2010-02-06 03:49:47 | 46.014 | -65.690 | 5.0 | 3.2 | 39 km NW from Sussex, NB. Felt. |
| 2010-10-13 09:21:01 | 46.476 | -64.884 | 5.0 | 2.2 | 10 km W from Bouctouche, NB |
| 2011-02-03 13:22:47 | 46.010 | -64.404 | 5.0 | 2.7 | 10 km N from Sackville, NB |
| 2011-11-27 02:11:54 | 46.354 | -65.663 | 5.0 | 2.3 | 46 km SW from Rogersville, NB |
| 2011-12-04 01:48:42 | 46.030 | -65.450 | 5.0 | 2.1 | 31 km W from Salisbury, NB |
| 2012-03-21 16:42:01 | 46.108 | -65.961 | 5.0 | 2.4 | 50 km NE from Oromocto, NB |
| 2012-05-31 06:58:25 | 45.486 | -65.247 | 5.0 | 2.3 | 33 km SE from Sussex, NB |
| 2012-09-09 03:47:58 | 45.318 | -65.509 | 5.0 | 2.4 | 36 km SE from Hampton, NB |
| 2013-02-02 07:20:48 | 46.020 | -64.797 | 5.0 | 2.2 | 11 km S from Moncton, NB |
| 2013-03-31 08:11:34 | 46.263 | -64.098 | 18.0 | 2.2 | 29 km SW from Summerside, PE |
| 2013-11-28 05:34:49 | 46.178 | -65.809 | 5.0 | 2.8 | 56 km NW from Sussex, NB |
| 2014-03-28 06:58:39 | 46.053 | -65.854 | 5.0 | 2.0 | 46 km NW from Sussex, NB |
| 2014-05-06 13:45:15 | 45.184 | -65.605 | 18.0 | 2.3 | 35 km E from Saint John, NB |
| 2014-05-06 13:45:15 | 45.178 | -65.629 | 5.0 | 2.3 | 33 km E from Saint John, NB |
| 2015-04-07 02:56:52 | 46.569 | -64.060 | 5.0 | 2.4 | 29 km NW from Summerside, PE |
| 2015-04-07 08:50:09 | 46.536 | -64.058 | 5.0 | 2.0 | 26 km NW from Summerside, PE |
| 2015-04-24 09:44:51 | 46.401 | -65.754 | 5.0 | 2.5 | 45 km SW from Rogersville, NB |
| 2015-12-25 07:19:11 | 45.975 | -66.003 | 5.0 | 2.0 | 40 km NE from Oromocto, NB |
| 2016-01-28 05:28:35 | 46.222 | -63.976 | 18.0 | 2.1 | 25 km SW from Summerside, PE |
| 2016-03-31 15:22:33 | 45.186 | -65.618 | 5.0 | 2.0 | 34 km E from Saint John, NB |
| 2016-05-15 00:41:28 | 45.941 | -65.489 | 5.0 | 2.1 | 24 km N from Sussex, NB |
| 2016-09-19 20:53:00 | 45.518 | -65.410 | 5.0 | 2.0 | 24 km S from Sussex, NB |
| 2016-10-11 07:27:43 | 45.909 | -65.860 | 5.0 | 2.3 | 34 km NW from Sussex, NB |
| 2016-12-14 11:27:31 | 46.572 | -64.988 | 5.0 | 2.1 | 15 km SW from Richibucto, NB |
| 2017-03-20 15:22:18 | 46.565 | -64.531 | 5.0 | 2.7 | 19 km NE from Bouctouche, NB |
| 2017-04-15 16:45:58 | 45.974 | -64.880 | 5.0 | 2.2 | 15 km SE from Salisbury, NB |
| 2017-04-16 15:36:17 | 46.394 | -65.725 | 5.0 | 2.1 | 44 km SW from Rogersville, NB |
| 2017-05-10 18:42:56 | 46.312 | -64.471 | 5.0 | 2.8 | 11 km NE from Shediac, NB |
| 2017-08-29 10:11:04 | 45.522 | -65.317 | 5.0 | 2.7 | 27 km SE from Sussex, NB |
| 2017-08-29 13:04:51 | 45.543 | -65.343 | 5.0 | 2.3 | 24 km SE from Sussex, NB |

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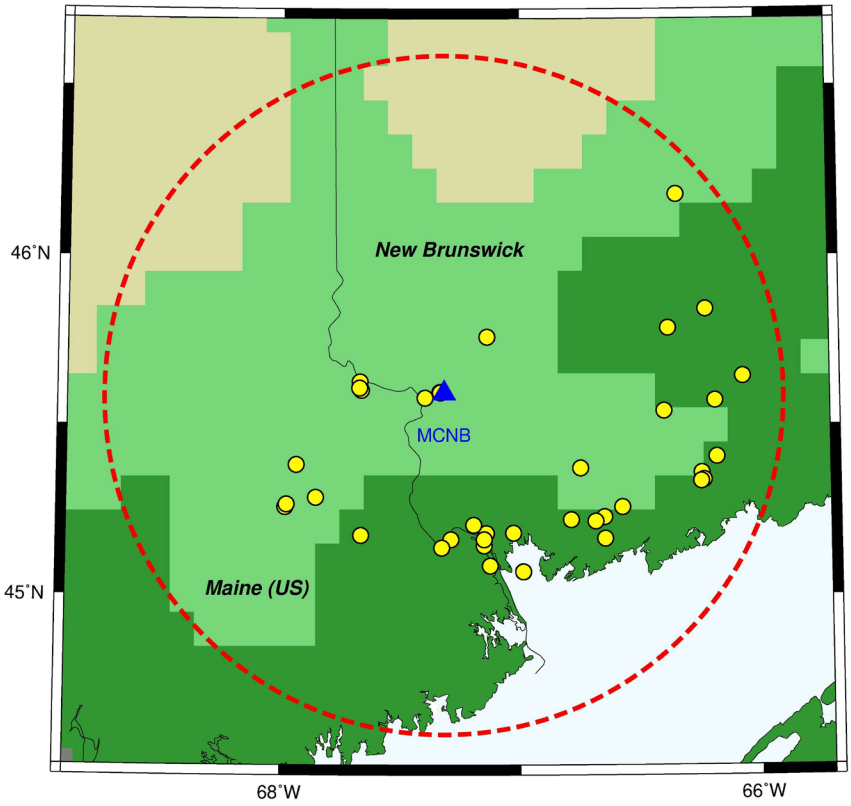
|---|---|---|---|---|---|
| 2017-10-18 08:04:22 | 46.291 | -65.116 | 5.0 | 2.3 | 29 km N from Salisbury, NB |
| 2018-01-31 02:31:03 | 46.141 | -65.838 | 2.0 | 2.2 | 53 km NW from Sussex, NB |
| 2018-02-01 21:00:13 | 46.149 | -65.838 | 2.0 | 2.6 | Chipman, NB |
| 2018-02-01 22:46:41 | 46.141 | -65.844 | 2.0 | 2.2 | Chipman, NB |
| 2018-02-02 05:45:47 | 46.159 | -65.848 | 2.0 | 2.6 | Chipman, NB |
| 2018-02-02 06:00:37 | 46.140 | -65.851 | 2.0 | 2.1 | Chipman, NB |
| 2018-03-18 16:19:05 | 45.489 | -65.597 | 2.0 | 2.1 | 21 km E from Hampton, NB |
| 2018-05-14 04:19:36 | 45.508 | -65.622 | 2.0 | 2.1 | 18 km E from Hampton, NB |
| 2019-01-19 16:16:07 | 46.148 | -65.838 | 2.0 | 2.0 | Chipman, NB |
| 2019-01-22 10:03:12 | 46.153 | -65.839 | 2.0 | 2.2 | Chipman, NB |
| 2019-01-27 17:29:11 | 45.722 | -65.947 | 5.0 | 2.9 | 23 km N from Hampton, NB. Felt |
| 2019-02-03 08:33:58 | 46.161 | -64.142 | 5.0 | 2.1 | 31 km E from Shediac, NB |
| 2019-03-14 10:54:56 | 45.746 | -65.942 | 5.0 | 2.0 | 25 km N from Hampton, NB |
| 2019-04-20 14:28:14 | 46.096 | -65.114 | 2.0 | 2.3 | 8 km NW from Salisbury, NB |
| 2019-04-23 02:17:25 | 46.222 | -64.165 | 5.0 | 2.1 | 28 km E from Shediac, NB |
| 2019-06-18 15:12:36 | 45.813 | -65.962 | 5.0 | 2.4 | 33 km N from Hampton, NB |
| 2019-09-04 07:27:49 | 46.459 | -65.478 | 5.0 | 2.0 | 31 km S from Rogersville, NB |

## Station MCNB




| Date/Time (UTC) | Latitude (°) | Longitude (°) | Depth (km) | Magnitude | Description |
|---|---|---|---|---|---|
| 2016-07-09 19:55:01 | 45.231 | -66.649 | 5.0 | 1.9 | 36 km NE from Saint Andrews, NB |
| 2016-07-13 17:59:56 | 45.182 | -67.143 | 5.0 | 1.9 | 12 km E from St. Stephen, NB |
| 2016-10-18 17:18:17 | 45.207 | -67.196 | 5.0 | 2.0 | 8 km E from St. Stephen, NB |
| 2016-11-04 03:52:54 | 45.261 | -67.985 | 5.0 | 2.0 | 55 km W from St. Stephen, NB |
| 2017-01-03 04:17:26 | 45.843 | -66.219 | 5.0 | 2.7 | 20 km E from Oromocto, NB |
| 2017-01-06 05:03:17 | 45.168 | -66.645 | 5.0 | 1.9 | 34 km E from Saint Andrews, NB |
| 2017-02-13 11:29:19 | 45.408 | -66.176 | 5.0 | 2.1 | 20 km NW from Saint John, NB |
| 2017-02-15 01:50:03 | 45.268 | -67.979 | 5.0 | 2.6 | 55 km W from St. Stephen, NB |
| 2017-06-25 08:56:36 | 45.385 | -67.938 | 5.0 | 1.8 | Maine, U.S. |
| 2017-07-01 16:17:57 | 45.289 | -67.856 | 5.0 | 2.5 | Maine, U.S. |
| 2017-07-26 13:29:37 | 45.184 | -67.030 | 5.0 | 2.4 | 11 km N from Saint Andrews, NB |
| 2017-07-28 22:56:51 | 45.087 | -67.127 | 5.0 | 1.9 | 5 km W from Saint Andrews, NB |
| 2017-08-18 05:21:37 | 45.260 | -66.573 | 5.0 | 1.9 | 42 km W from Saint John, NB |
| 2018-01-05 13:27:47 | 45.543 | -66.396 | 2.0 | 2.1 | 33 km S from Oromocto, NB |
| 2018-03-14 22:19:48 | 45.341 | -66.235 | 2.0 | 2.9 | 18 km NW from Saint John, NB. Felt |
| 2018-03-27 04:52:44 | 45.599 | -67.337 | 0.6 | 2.6 | 2 km W from McAdam, NB. Felt |
| 2018-03-29 03:11:16 | 45.597 | -67.335 | 0.6 | 2.6 | 2 km W from McAdam, NB. Felt |

| | | | | | |
|---|---|---|---|---|---|
| 2018-09-19 16:07:54 | 45.177 | -67.667 | 5.0 | 2.1 | 29 km W from St. Stephen, NB |
| 2018-10-15 07:41:24 | 45.223 | -66.787 | 2.0 | 1.9 | 27 km NE from Saint Andrews, NB |
| 2019-01-10 13:49:00 | 45.361 | -66.240 | 2.0 | 3.8 | 19 km NW from Saint John, NB. Felt |
| 2019-01-10 14:43:09 | 45.341 | -66.231 | 5.0 | 1.8 | 18 km NW from Saint John, NB. Felt |
| 2019-07-29 07:12:02 | 45.762 | -67.139 | 2.0 | 2.0 | 23 km NE from McAdam, NB |
| 2019-08-05 21:58:56 | 45.574 | -66.182 | 5.0 | 2.1 | 26 km W from Hampton, NB |
| 2019-10-26 02:49:05 | 45.604 | -67.667 | 2.0 | 2.0 | 28 km W from McAdam, NB |
| 2019-10-27 17:16:27 | 45.629 | -67.672 | 2.0 | 2.6 | 29 km W from McAdam, NB |
| 2019-10-27 19:45:09 | 45.611 | -67.674 | 2.0 | 1.9 | 29 km W from McAdam, NB |
| 2019-11-04 20:52:05 | 45.069 | -66.987 | 5.0 | 2.5 | 6 km E from Saint Andrews, NB |
| 2020-01-19 08:32:42 | 45.645 | -66.064 | 5.0 | 2.5 | 21 km NW from Hampton, NB |
| 2020-01-23 07:29:11 | 45.164 | -67.290 | 2.0 | 2.1 | 2 km S from St. Stephen, NB |
| 2020-02-07 19:18:51 | 45.582 | -67.400 | 5.0 | 2.2 | 7 km W from McAdam, NB |
| 2020-02-08 00:41:29 | 45.140 | -67.329 | 5.0 | 2.0 | 5 km SW from St. Stephen, NB |
| 2020-05-20 11:01:20 | 46.182 | -66.339 | 5.0 | 1.9 | 37 km NE from Fredericton, NB |
| 2020-08-30 14:19:55 | 45.218 | -66.686 | 2.0 | 2.0 | 33 km NE from Saint Andrews, NB |
| 2020-11-09 19:18:17 | 45.375 | -66.747 | 5.0 | 2.3 | 41 km NE from Saint Andrews, NB |
| 2020-12-09 10:44:52 | 45.146 | -67.151 | 5.0 | 2.7 | 10 km NW from Saint Andrews, NB. Felt |
| 2020-12-09 12:31:16 | 45.164 | -67.151 | 5.0 | 2.9 | 11 km NW from Saint Andrews, NB. Felt |
| 2020-12-10 18:07:32 | 45.787 | -66.378 | 5.0 | 2.1 | 10 km SE from Oromocto, NB |
| 2020-12-29 11:37:37 | 45.337 | -66.243 | 5.0 | 2.0 | 18 km NW from Saint John, NB |